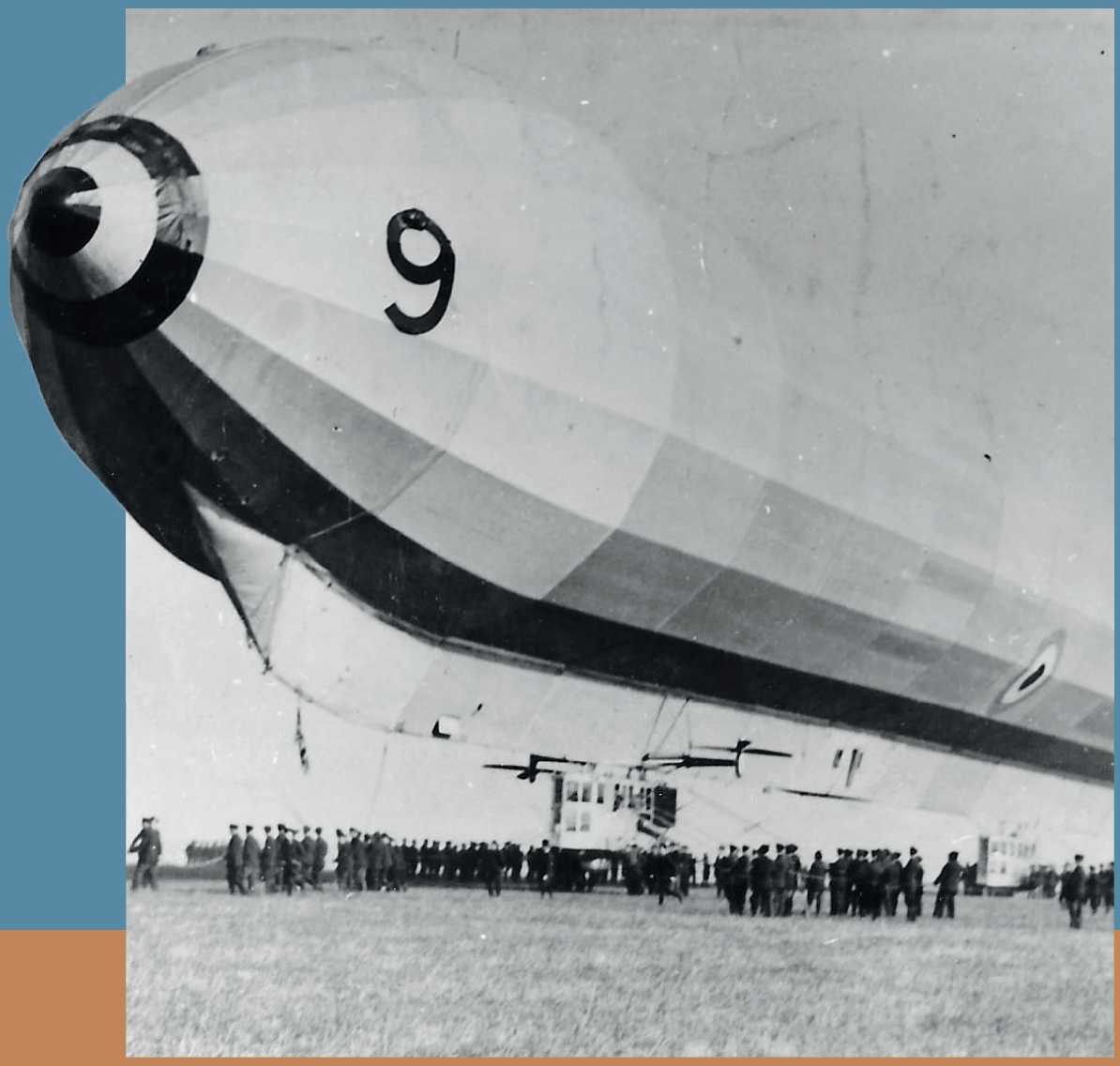
AIRSHIPS

Over Lincolnshire



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Cranwell Aviation Heritage Museum

Cranwell Aviation
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INTRODUCTION

This file contains material and images which are intended to complement the displays and presentations in Cranwell Aviation Heritage Museum's exhibition areas.

This file looks at the history of military and civilian balloons and airships, in Lincolnshire and elsewhere, and how those balloons developed from a smoke filled bag to the high-tech hybrid airship of today.

This file could not have been created without the help and guidance of a number of organisations and subject matter experts. Three individuals undoubtedly deserve special mention:

Mr Mike Credland and Mr Mike Hodgson who have both contributed information and images for you, the visitor to enjoy.

Last, but certainly not least, is Mr Brian J. Turpin whose enduring support has added flesh to what were the bare bones of the story we are endeavouring to tell.

These gentlemen and all those who have assisted with 'Airships over Lincolnshire' have the grateful thanks of the staff and volunteers of Cranwell Aviation Heritage Museum.

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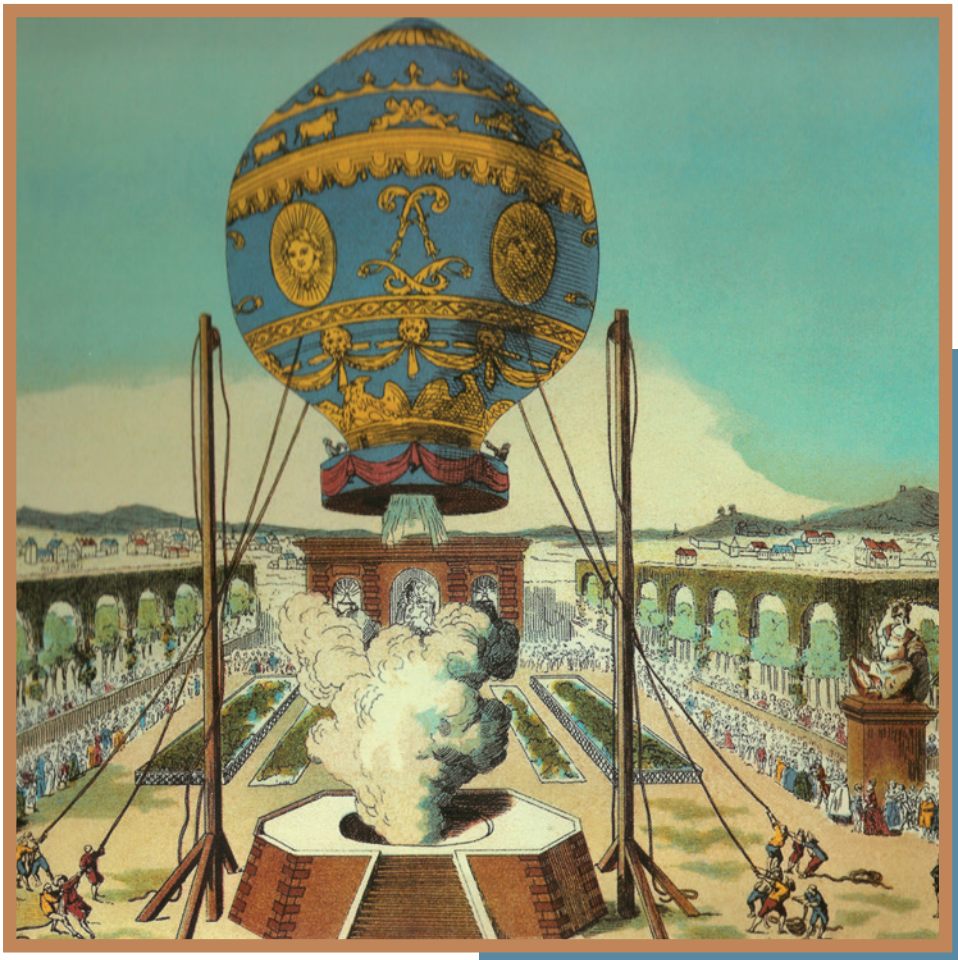


The first manned balloon flight
Image - Wikimedia Commons

EARLY HISTORY OF BALLOONING

Balloon – "A large bag filled with hot air or gas to make it rise in the air, typically one carrying a basket for passengers."
Oxford English Dictionary

In 1766, an English man, Henry Cavendish identified a gas he named 'Phlogiston' that was also referred to as 'inflammable air' and later as hydrogen. Highly explosive when mixed with air, hydrogen is one of the lightest substances on the planet, and also one of the most common, being a constituent of water.

The same year, Joseph Montgolfier began experiments using small paper and cotton globes filled with 'inflammable air', but the gas seeped out through the pores of the material. So he renewed his experiments with a different sort of lifting gas.

Montgolfier observed that smoke and cinders rose above a fire concluding that combustion must be generating the qualities of 'inflammable air'. He did not appreciate that hot air is lighter than ordinary air. He set about generating the smelliest and smokiest fires he could, and suspending balloons over them. Luckily, the smoke blocked the pores of the materials he used, and his spheres rose to the sky.

In June 1783, Joseph and his brother Etienne organised a public display in Annonay, France. They suspended a 25 foot high, cotton and paper balloon over a fire. When inflated and released the sphere rose to an estimated 6,000 feet, stayed airborne for 10 minutes and came back down to earth one and a half miles away.

Meanwhile, in Paris, a physicist called Jacques Charles who had a clear understanding of hydrogen, in conjunction with the Robert brothers, who had developed a technique to make silk impervious to gas, was developing the world's first hydrogen balloon.

In September 1783, the Montgolfier brothers caused another commotion, this time in Paris by sending a cockerel, a duck and a sheep into the sky in a hot air balloon. The next step would be to send a human 'aeronaut' aloft. King Louis XVI felt that this dangerous undertaking would be best carried out by a volunteer from one of the country's prison population. He was persuaded to change his mind by a young daredevil Jean-Françoise Pilâtre de Rozier and his friend Françoise Laurent, the Marquis d'Arlandes.

0n 15 October 1783, de Rozier made a tethered ascent in Paris. On 21 November 1783 the Montgolfier balloon was ready for free flight. The balloon had a volume of 79,000 cubic feet and the paper and cotton envelope was resplendent in blue and gold. Once again the sphere was inflated over an obnoxious bonfire, with the restraining ropes cut, the balloon along with two aeronauts rose skyward. Using pitch forks to stoke the flames and water to put out small burn holes in the canopy, de Rozier and Laurent travelled 900 yards and were aloft for 25 minutes.

Eleven days later Jacques Charles and Noël Robert took to the air in their gas balloon. It had a valve at the base of its envelope to vent off gas. Ballast was thrown overboard to make the balloon rise and gas was vented to make it descend. This design was effectively the baseline for all gas balloons that followed.

BALLOONS – EARLY MILITARY USAGE

"The balloon's gone up."
Common saying denoting the outbreak of hostilities

Since the first manned flight, the balloon has been used to observe enemy positions, drop bombs, propaganda leaflets and transport men deep into enemy held territory. Even Montgolfier, saw the innovation as a way of attacking English forces holding Gibraltar.

FRENCH BALLOON CORPS

In 1789, a study commissioned in France recommended that balloons be used so that 'observers, placed like sentinels, hidden in the clouds would observe the movements of the enemy'.

A balloon for France's Army of the North was ordered four years later. It was manned by two officers, one to observe the enemy and direct ground artillery fire, the other to manage the balloon and communicate with troops on the ground, by flags or by sending written messages down the tether ropes.

AMERICAN CIVIL WAR

With the USA on the brink of civil war several professional aeronauts volunteered their services. One of them, Thaddeus Lowe, proposed establishing a Balloon Corps to support the Union Army.

Lowe met with President Lincoln in June 1861. After outlining his vision of the Balloon Corps to the President, Lowe offered a practical demonstration. His balloon could communicate with the ground by means of telegraph cables attached to the tether rope.

Lowe was duly appointed to form a Balloon Corps.

Lowe's first purpose built balloon made its inaugural flight on 24 September 1861. From an altitude of 1,000ft he reported the presence of Confederate forces three miles away and accurately guided the fire of federal guns onto the enemy.

At its peak, Lowe's Balloon Corps comprised six balloons.

BRITISH MILITARY USAGE

The British military were slower to embrace ballooning. During the American Civil War, Capt. F. Beaumont of the Royal Engineers had been attached to Lowe's Balloon Corps. He attempted to get balloons taken seriously and in 1863 arranged a demonstration at Aldershot.

There were no significant developments, until 15 years later, when in 1878 Capt. J.L.B. Templer an amateur aeronaut brought his own balloon to the Woolwich Arsenal. This culminated in balloon training commencing at Aldershot and a balloon detachment taking part in manoeuvres. A balloon school, balloon factory and depot were subsequently established at Chatham.

Initially, the balloons were made of varnished fabric and inflated with coal gas, which was cheaper than hydrogen but not as efficient. The problem with hydrogen was how to transport it. A suggestion originally made by Lt Watson in 1875, that hydrogen could be compressed and stored in steel cylinders solved this. With the invention of a gas tight valve in 1884, hydrogen was being successfully stored in cylinders and a small balloon could be inflated in 15 minutes rather than the several hours previously taken.

This innovation meant that the balloon's envelope needed to be made of a fabric that could contain hydrogen. Capt. Templer's solution was to use 'gold-beaters' skin which was made from ox intestines. The first balloon made using gold-beaters skin was completed in 1883. It was small by any standards, but able to lift a man aloft. The following year, three balloons accompanied the British Expeditionary Force to Bechuanaland, Africa

AIRSHIPS

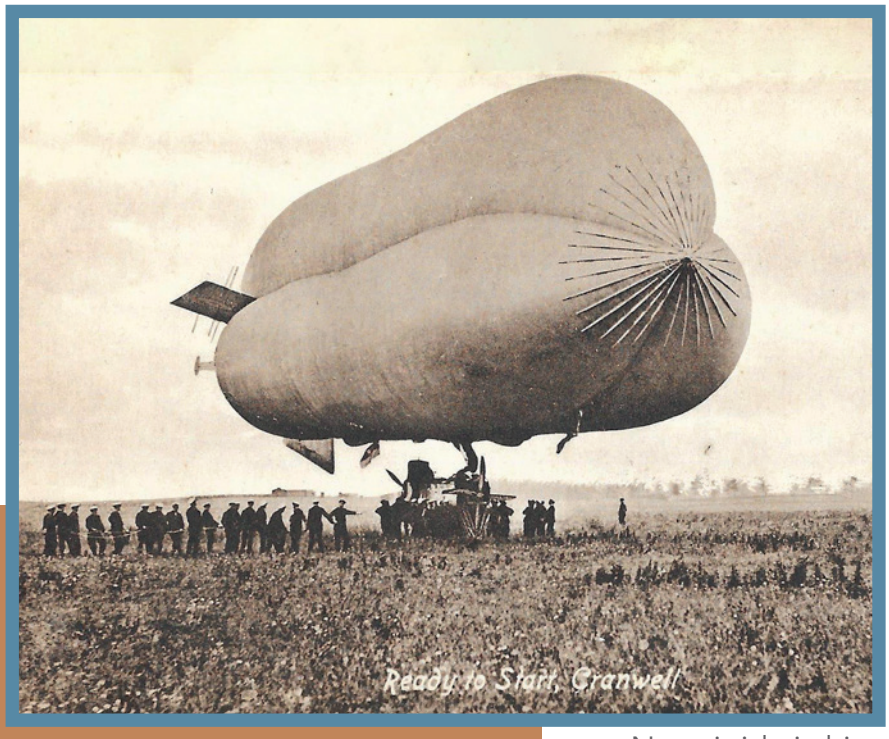
Balloon – "A large bag filled with hot air or gas to make it rise in the air, typically one carrying a basket for passengers."
Oxford English Dictionary

The airship was a logical progression of the balloon. The main downside to the balloon is that in free flight it is at the mercy of the prevailing wind direction. Rather than being spherical, the envelopes of airships, which hold the lifting gas, are typically cigar shaped and being equipped with propellers and rudders can be steered through the air. Airships are crewed from control cars or gondolas which are suspended below the envelope. The first recorded powered flight took place in 1852 when Henri Giffard flew 17 miles in his steam-powered airship.

The invention of the internal combustion engine significantly enhanced airship development. In the early 20th century, airships had two main advantages over aeroplanes: they could carry more people and in the event of engine failure, they became free floating balloons.

All airships carried ballast which could be released to maintain height, in the event of the loss of gas. The larger the volume of gas an airship contained, the more weight it could carry, be that engines, fuel, people or payload.

In essence, there are three different types of airship: non-rigid, semi-rigid and rigid. These descriptions refer to the structure of the gas containing envelope.



Non-rigid airship at Cranwell
Image – Courtesy of Mr G Dear

NON-RIGID AIRSHIPS
The envelopes of non-rigid airships have no internal structure and rely on the pressure of the lifting gas and the strength of the envelope itself to maintain their shape.

SEMI-RIGID AIRSHIPS
Semi-rigid airships were fitted with a keel or metal frame underneath the entire length of the envelope, to give greater rigidity. The first British Army airship, 'Nulli Secundus' which means 'Second to none' was a semi-rigid.

RIGID AIRSHIPS
The envelopes of rigid airships consist of a framework covered in fabric and contain a number of gas-bags filled with a lifting gas. All German Zeppelins were of the rigid type. The British airship R100 had fifteen gas-bags.

Portable balloon shed – Cranwell
Image – CAHM Archive

CRANWELL'S LIGHTER THAN AIR SECTION

"On and after 1st April 1916 all officers under instruction in aeroplanes, kite balloons and airships are to graduate as pilots at Cranwell"
General Memorandum No. 14 of 24 February 1916

The Lighter than Air Section was established on Cranwell's North Airfield to conduct balloon and airship activities. Its first building, a portable balloon shed, was erected in March 1916. In the image above, an inflated spherical coal gas balloon is just visible inside, while outside Royal Navy personnel prepare a basket for flight.

The first ascent at Cranwell was made by a tethered kite balloon on 4 April 1916. Six spherical coal gas balloons were added to the Section's strength in May 1916, coming from Wormwood Scrubs Naval Air Station. By the end of the year, these had been joined by two hydrogen balloons and all were used for free balloon training. All airship crew members and not just the pilots were required to complete a course in free ballooning before starting to fly airships.

The various types of Submarine Scout (SS) airships, which were also referred to as Sea Scouts were the chief type of lighter than aircraft used by the Admiralty during World War 1. A portable SS airship shed was transferred to Cranwell from Anglesey. After a first attempt was thwarted by a gale it was finally erected in November 1916.

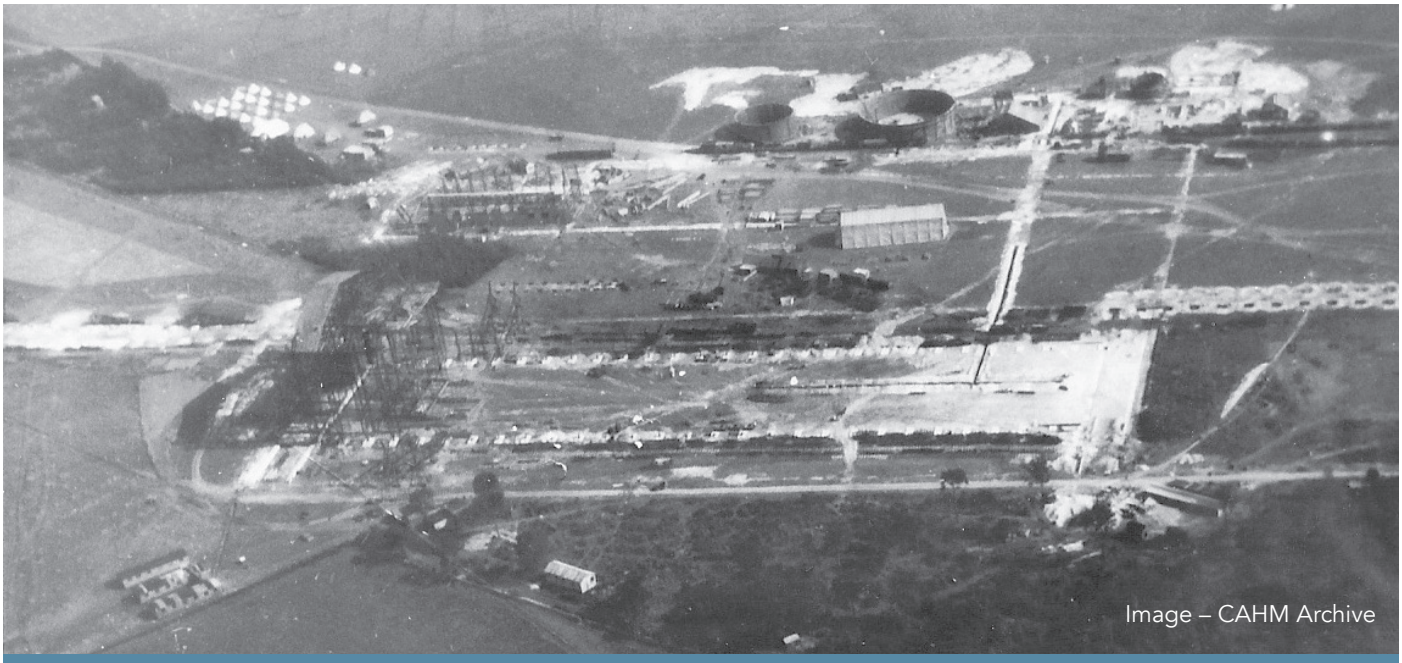
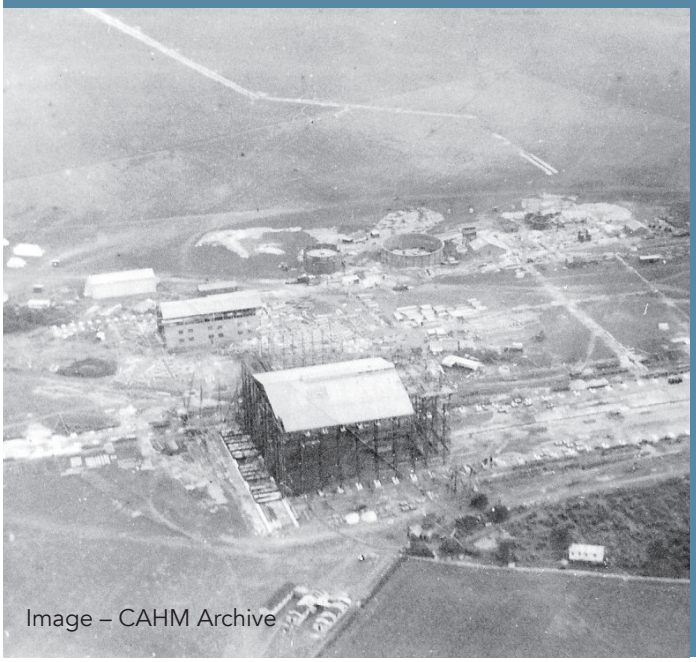


Image – CAHM Archive



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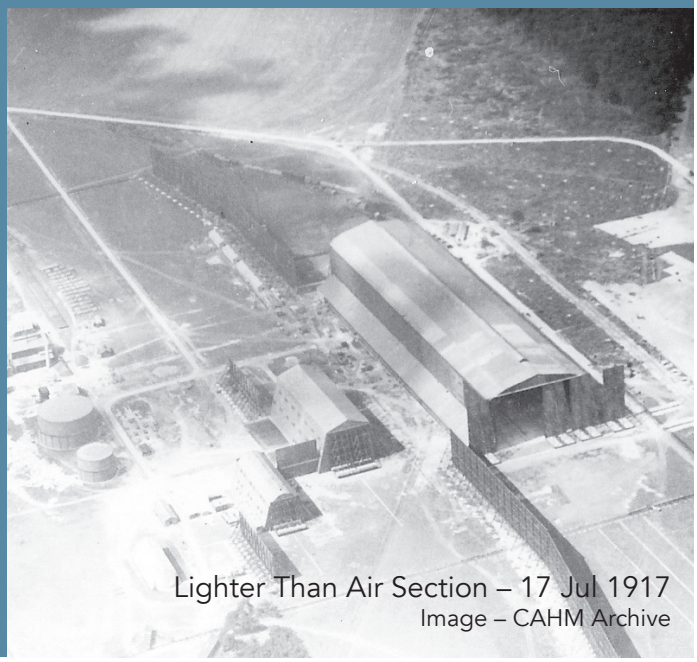


Lighter Than Air Section – 17 Jul 1917
Image – CAHM Archive

SS 31 was the first airship to successfully fly to Cranwell, arriving on 29 November to begin training duties in December 1916. A previous attempt by SS 39 to fly to Cranwell had ended in failure when it crashed in Thurlby village, after a valve failure, on its delivery flight on 15 November 1916.

Construction of the Section's rigid shed commenced in late 1916. The portable balloon shed can be seen in the centre of the upper photograph while in the lower left one it has been moved to its final position on the site. In 1917, with construction work completed, the portable shed was demolished.

With hydrogen storage tanks full and the three main sheds for SS and rigid airships, each with its attendant wind screen in place, the construction of the Lighter than Air Section was completed in July 1917. In its first year, the Section had five officers and 131 ratings on its strength, 93 of those ratings were undergoing training.

In the year 1917-1918, the Section's strength had risen to 47 officers and 203 ratings with 75 officers graduating as airship pilots.

Demolition of the rigid shed
Image – CAHM Archive

At the end of World War 1, the Lighter than Air Section was disbanded and by the middle of 1919 all its airships had been scrapped or moved away. It had been decided that the future of military aviation lay with heavier than air aircraft. The Section's buildings were all demolished in the early 1920s.

Today a visible reminder of the days when airships flew from Cranwell is a road in RAF Cranwell named 'Lighter Than Air Road'.

CRANWELL'S AIRSHIPS

"It was amazing how many people could get in these small ships."
Captain HRH Ward AFC commenting on his basic training at Cranwell in 1917 – Extract from 'Coastal Patrol' - Copyright Brian J Turpin 2016

Below is just a small selection of the airship types that were stationed at Cranwell.

SS airship over RFC Waddington - 1917
Image – Courtesy of Aviation Heritage Lincolnshire

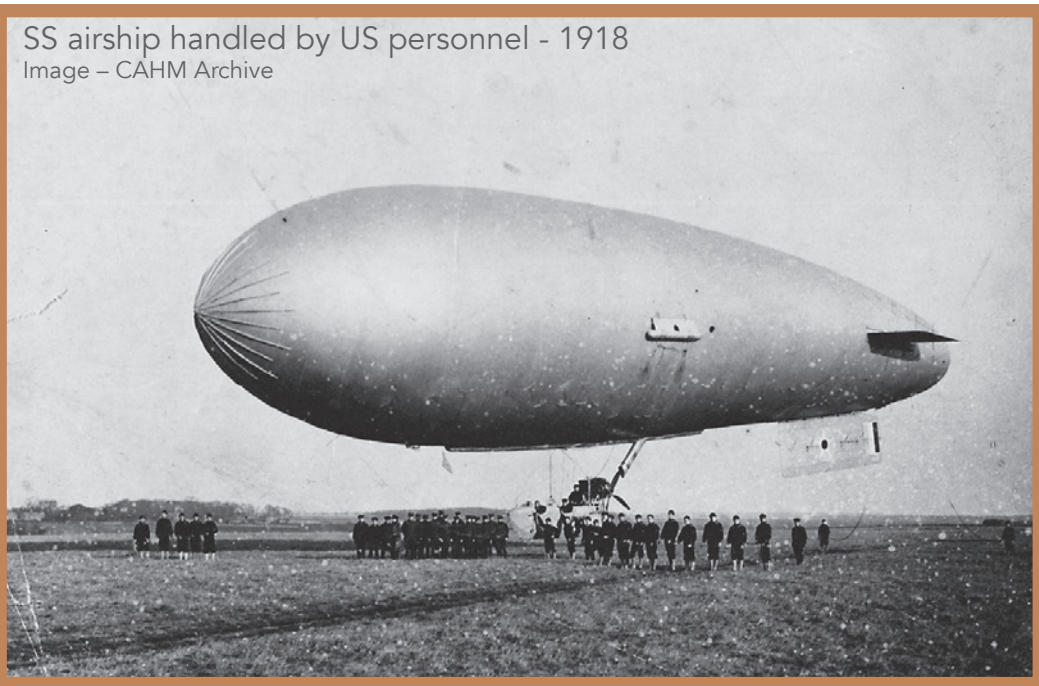
SUBMARINE SCOUTS

Submarine Scout (SS) airships or Sea Scouts as they were also known as were designed to seek out German submarines from the air. They usually had a crew of two and were armed with 160 pounds of bombs. The SS were also equipped with a wireless telegraph (W/T) set so they could contact surface ships to engage any U-Boats spotted.

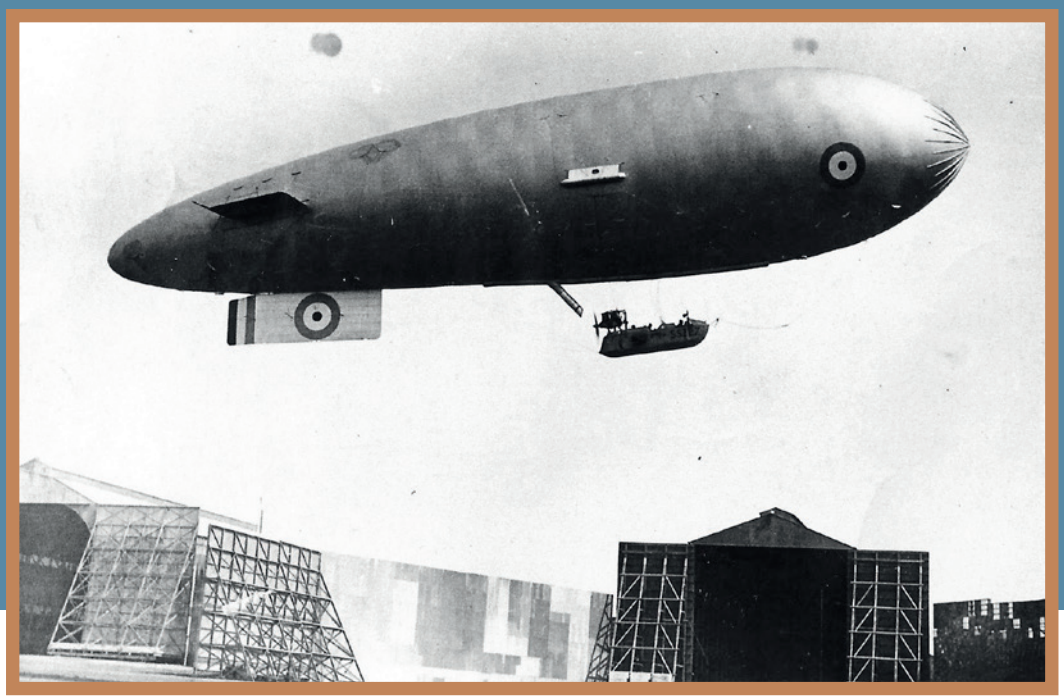
The SS airships had a maximum speed of 50 MPH and a flight endurance of approximately 8 hours. All of the SS airships that operated at Cranwell were equipped with Maurice Farman control cars as they were larger than the standard type and could carry additional students. SS airships operated at Cranwell between November 1916 and early 1919.

SS ZEROS

The SS Zero (SSZ) airships were a modified version of the SS airships which carried a crew of three, a pilot, a W/T operator and an engineer. SSZ 23 was stationed at Cranwell from December 1917 to March 1918.



SS airship handled by US personnel - 1918
Image – CAHM Archive



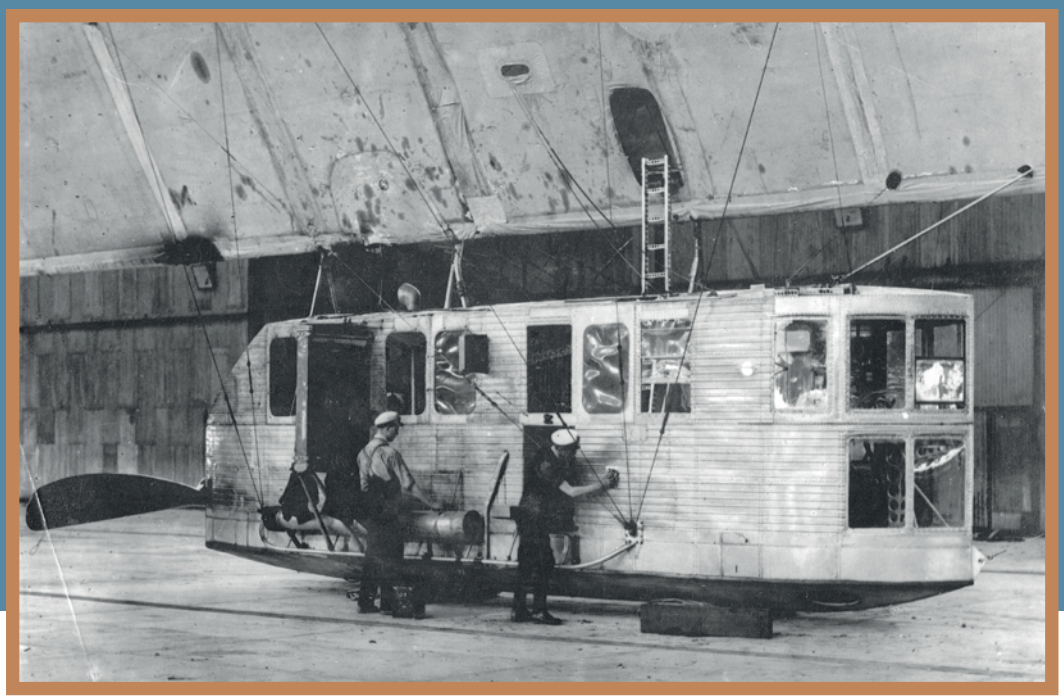
SS Zero in flight
Image – Courtesy of Mr MJ Hodgson

She was the property of the US Navy and was used at Cranwell to train US Navy cadets using RNAS personnel as instructors. In March 1918, SSZ 23 relocated to Howden, Yorkshire, from where the recently trained US pilots conducted routine patrol activities.

HIS MAJESTY'S AIRSHIP NUMBER tt9 RIGID (HMA No 9R)

HMA No 9R was ordered in 1913. She became the first successful British rigid airship when she completed her maiden flight in November 1916. HMA No 9R was designed by Vickers chief designer H Pratt and his assistant Barnes Wallis.

HMA No 9R - 1917
Image – Courtesy of Mr MJ Hodgson

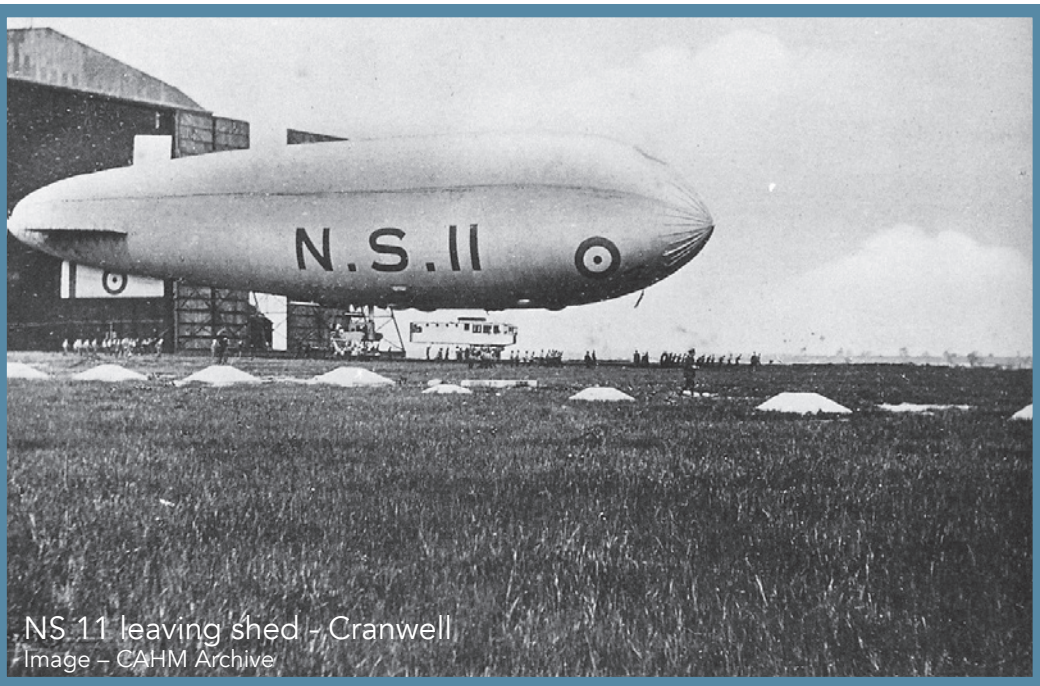


HMA No 9R's aft car
Image – Courtesy of Mr MJ Hodgson

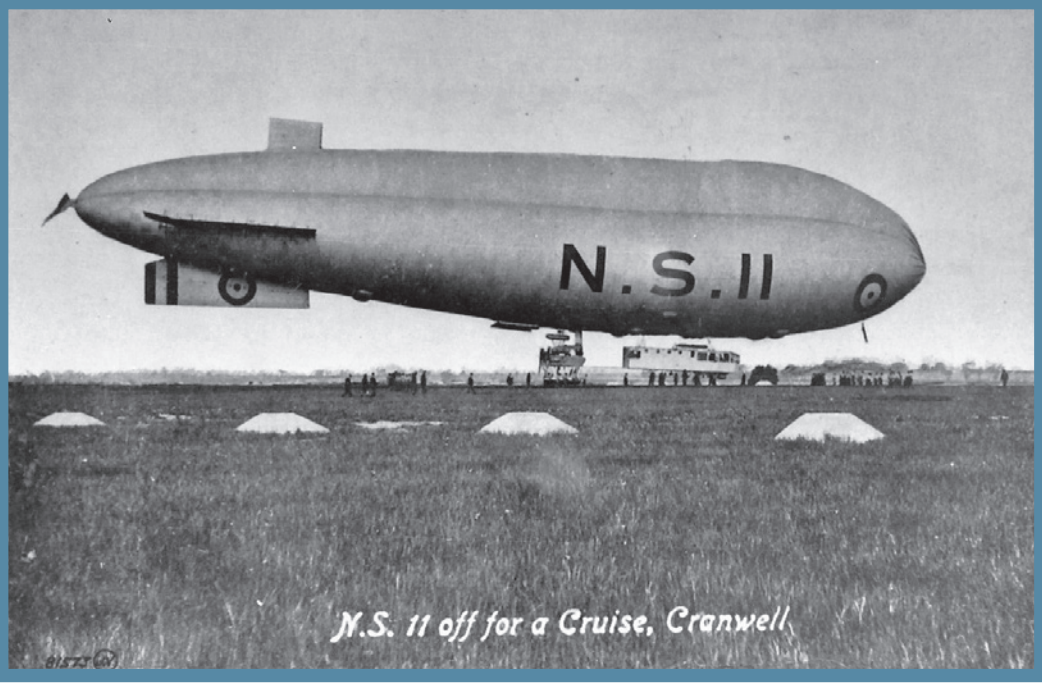
She was 526 feet in length and had a maximum speed of 43 MPH. During her career HMA No 9R, completed approximately 165 flying hours and was mainly used for experimental work. She was based at Cranwell during October 1917.

NORTH SEA 11

The North Sea (NS) class of non-rigid airships were originally introduced into service as an interim measure until the large rigid airships were ready for operations. They had an enclosed control car which included living and sleeping quarters. NS airships typically carried a crew of up to 10 men who operated in two watches.



NS 11 leaving shed - Cranwell
Image – CAHM Archive



NS 11 - Cranwell
Image – CAHM Archive

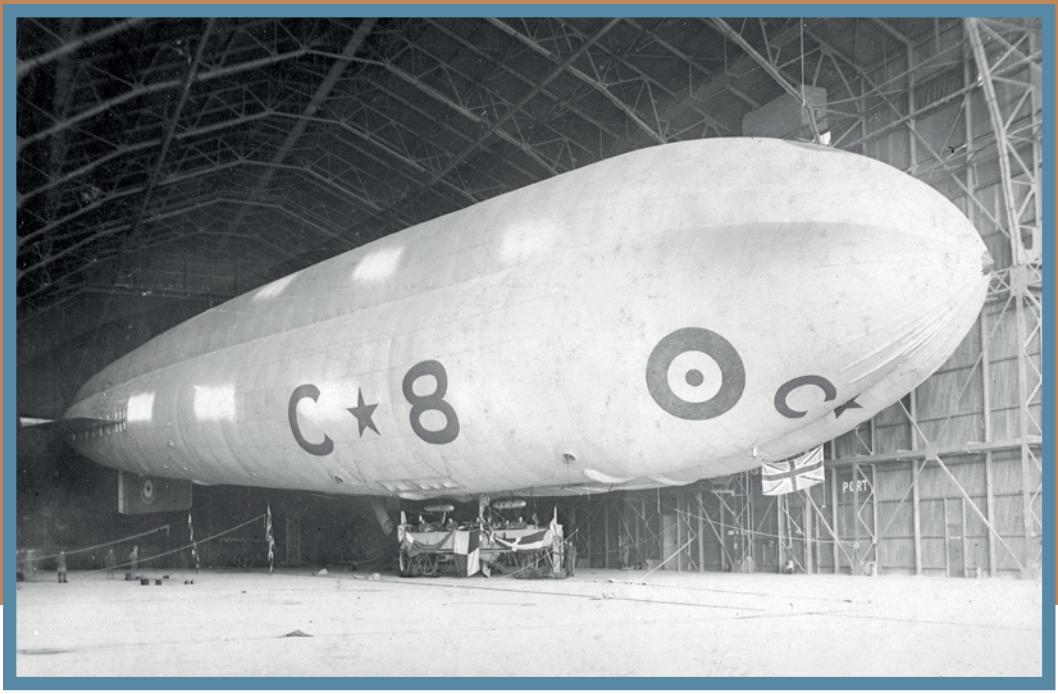
NS 11 set a world endurance record in February 1919 when she flew 4000 miles in just over 100 hours. NS 11 was stationed at Cranwell between March and June 1919. On 15 July 1919 flying from her new base at Pulham, Norfolk, NS 11 was lost off the Norfolk coast. She caught fire in the air as a result, it is believed, of being hit by lightning. None of her crew survived.

CRANWELL - A STOPPING OFF POINT

A large number of airships transited Cranwell usually stopping off on delivery flights to their permanent stations.

Although the airships had the range to make the flights direct, airships were slow and uncomfortable when flying over land due to turbulence and thermals. Therefore crews often seized the chance to stop off especially if it meant the chance of a hot meal and the opportunity to catch up with old colleagues.

SSZ 33 visited Cranwell in Mar 1918
Image – CAHM Archive



Coastal Star 8 visited Cranwell Jul-Aug 1918
Image – Courtesy of Mr MJ Hodgson

BALLOONS AND AIRSHIPS AT CRANWELL

The level of detail included below was achieved due to the input received from airship historian and author Brian J Turpin.

Balloons stationed at Cranwell

Type	Dates at Cranwell	Remarks
Kite Balloon		The first ascent at Cranwell was made in a kite balloon on 4 Apr 1916.
Balloon Spherical – Coal Gas 'North Star'	1916 - 1917	All airship crew were required to complete a course in free ballooning before starting to fly airships. This included W/T operators, engineers, etc and not just the pilots.
Balloon Spherical – Coal Gas 'Shark'	1916 - 1917	
Balloon Spherical – Coal Gas 'Shrimp'	1916 - 1917	
Balloon Spherical – Coal Gas 'Meteor'	1916 - 1917	
Balloon Spherical – Coal Gas 'Plover'	1916 - 1917	
Balloon Spherical – Coal Gas 'Leda'	1916 - 1917	
Balloon Spherical – Coal Gas 'Lapwing'	1916 - 1917	
Balloon Spherical – Hydrogen 'Achilles'	1916 - 1917	
Balloon Spherical – Hydrogen 'Velocity'	1916 - 1917	

Airships stationed at Cranwell

Type	Dates at Cranwell	Remarks
Submarine Scouts SS 28	4 Oct 1917	SS 28 was originally based at Pulham from 23 January 1917, to 15 September, 1917, when she suffered an engine failure and made a free balloon landing at Postwick, Norfolk. During the landing the rudder was smashed and the ship deflated for transport back to Pulham. She was transferred to Cranwell on 4 October 1917, where the car was extensively repaired in the Station workshops.
Submarine Scouts SS 28A	11 Mar 1918 - 18 Mar 1919 Deflated 23 May 1919	As was standard practice after a rebuild, the ship became the SS 28A when she resumed flying on 11 March 1918. Last known flight was on 18 March 1919, when she had completed 750 hours on crew training, mainly without incident - a remarkable record, particularly as she was a late starter. She was deflated on 23 May and deleted the following October having flown a total of over 800 hours (Pulham and Cranwell).
Submarine Scouts SS 29	11 Dec 1917 Deflated 27 Jan 1919	SS 29 first served at Folkestone, being delivered there in January 1916, but not flying until 21 September 1916, until November 1917. On 11 December 1917, she was flown to Cranwell via Kingsnorth. She was in service until 3 September 1918, when it was decided to reconstruct the car. No accident is recorded but the car was probably worn out and needed refurbishing. She was deflated on 27 January 1919 and deleted in September.
Submarine Scouts SS 30	20 Mar 1917	SS 30 was delivered to Polegate in March 1916, but didn't fly until 16 October. She was in service there until 27 November 1916, when she force landed at Beachy Head due to engine failure. She was damaged during the landing. Transferred to Cranwell on 20 March 1917.
Submarine Scouts SS 30A	3 Dec 1917 - 14 Nov 1918	She was rebuilt as SS 30A in a modified form and was able to carry a crew of four. Resumed flying on 3 December 1917, and was then in continuous service at Cranwell until 14 November 1918, when she was deflated to examine the envelope. She was not used again having flown a total of 856 hours (+).

Airships stationed at Cranwell

Type	Dates at Cranwell	Remarks
Submarine Scout SS 31	29 Nov 1916 - 11 Jul 1917	SS 31 was first flown at Kingsnorth on 27 November 1915, and was used for training there until 21 October 1916. She was transferred to Cranwell on 29 November, and made a trial flight there on 22 December 1916. She was then in service until 11 July 1917, when she collided with the roof of the rigid shed and made a free balloon landing 3 miles away. Undercarriage of car wrecked and propeller broken. The crew were: PFO J D W Cripps and AM Bance, plus one.
Submarine Scout SS 31A	14 Feb1918 - Jan 1919	She was rebuilt as SS 31A by F Sage & Co. Resumed flying on 14 February 1918. She was then in continuous service until 19 September 1918 when she made a forced landing on the airfield, partly owing to the weather. The ship broke away from the landing party twice and eventually landed 1 mile west of the Rigid Shed with damage to the car and planes. The car was under repair during October - December but was not completed. Withdrawn from use January, 1919, without having flown again. Total flight time was 842 hours (+).
Submarine Scout SS 37	28 May 1917 - 14 Jan 1918	SS 37 delivered to Pembroke on 21 October 1916, but not flown there until 18 March 1917. Used there until 23 April 1917, and then transferred to Cranwell on 28 May 1917. First flown there on 6 August 1917, and used until 14 January 1918, when on the sixth flight of the day an engine failure led to a forced landing at Harpswell, to the east of Gainsborough. The crew were PFO P H Blackman, LM Hosmer and AMs Rich and Dover. PFO Blackman was thrown out on landing and suffered a broken leg and injuries to both ankles. Car badly damaged.
Submarine Scout SS 37A	6 Jul 1918 - 18 Mar 1919	Rebuilt as SS 37A with single skid beneath car. Resumed flying on 6 July 1917, and was in continuous service until 18 March 1919. No further flights recorded. Total flight time was 313 hours (+).

Type	Dates at Cranwell	Remarks
Submarine Scout SS 39	Jan - 20 Jul 1917	SS 39 assembled at Wormwood Scrubs in August 1916, but was not flown until 11 November. On 15 November, she set off for Cranwell but was wrecked near Sleaford owing to a faulty valve causing an uncontrolled descent from 700 feet. The crew were Flt Cdr A Corbett Wilson (CO of Wormwood Scrubs) with Flt Sub-Lt H T Jones and PO Veitch. Crew were unhurt. Ship returned to Wormwood Scrubs for a rebuild and was delivered to Cranwell in January, 1917. Flying started on 11 May 1917, and continued until 20 July when the tragic accident occurred that killed Wing Cdr CM Waterlow, PO MG Collins and AC Lightstone.
Submarine Scout SS 39A	15 Aug 1917 - 29 Jan 1919	Ship rebuilt as SS 39A and first flown on 15 August 1917. Was then in continuous service until 20 December, 1918. She was deflated on 29 January, 1919 and deleted in September. Total flight time was 372 hours (+).
Costal C 13	22 Jan 1917 - 27 Jul 1917	Coastal C 13 first flew at Kingsnorth on 3 July 1916, and was used there for instructional flights until 7 December and was deflated on 10th due to loss of gas purity. She resumed flying on 2 January 1917, and after two false starts set off for Cranwell on 22 January. She was used for instruction until 9 May 1917, when she was deflated owing to the envelope failing to hold gas. The envelope was sent to White City for overhaul and redoping and was not back at Cranwell until 3 July. She then resumed training flights until 27 July 1917, when she was hit by a line squall while being taken into the shed. The ship was dragged from the hands of the landing party and drifted away. The rear engine was started but the ship failed to make headway. She landed and was deflated to prevent further damage. The envelope went back to White City again and the car to Sage & Co for repair. The ship did not return to Cranwell but was sent to Pulham.

Type	Dates at Cranwell	Remarks
SS Pusher SSP 1 & SSP 6	26 Mar 1918 - 24 Jan 1919	SSP 1 first flew at Kingsnorth on 31 January 1917, and after trials was delivered to Folkestone on 15 March. On 15 June 1917, she returned to Kingsnorth and prepared for delivery to Anglesey. She left Kingsnorth on 28th June, landing at Cranwell for the night, resuming her journey on 2 July to Howden, on 4 July to Barrow and finally to Anglesey on 5 July. She was in service there until 24 March 1918, when she flew to Howden and then to Cranwell on 26 March. There now enters some confusion in the records because in July the ship was laid up for an engine change and for some reason the car of SSP 6 was fitted with SSP 1's envelope, whereupon it was officially stated in the Daily Report that the SSP 1 would now become SSP 6. This went against convention that the identity of an aircraft remained with the car (or fuselage in the case of an aeroplane) and not with the envelope (wings). So one car might have many new envelopes but retained its original identity. The identification markings for the SSPs were on the envelope rather than the car so if you see a photo of SSP 1 taken after July, 1918, it could well be the original SSP 6 and vice versa. The original SSP 1 car (new SSP 6) continued in service at Cranwell until a last flight on 24 January 1919, followed by deflation on 31 January. Stored for a while at Cranwell she was deleted in September, 1919. SSP 6 first flew at Wormwood Scrubs on 8 June 1917, and after trials departed for Anglesey via Cranwell (13 June), Howden (14 June), Barrow (15 June) arriving at Anglesey on the 15th. She served there until 25 February 1918, when she suffered an engine failure while on patrol 10 miles south west of Southport. She made a free balloon landing at Feniscowles, 8 miles south of Preston in a 30 mph wind. The car was dispatched to Cranwell on 12 April, the ship being laid up until July when the envelope switch took place and SSP 6 became SSP 1. For the record, after July 1918, the original SSP 6 (now SSP 1) continued in service at Cranwell until a last flight on 24 January 1919, and deflation on the 31st.

Type	Dates at Cranwell	Remarks
SS Pusher SSP 5	26 Mar 1918 - 29 Jan 1919	First flew at Wormwood Scrubs on 11 May 1917, and landed at Cranwell on the 13th en route to Anglesey. Departed on the 14th to Howden. Delivered to Cranwell from Anglesey via Howden on 26 March 1918, in company with SSP 1. Remained in service there until last flight on 19 November, 1918. Deflated on 29 January, 1919, having flown 567 hours (+) of which 140 (+) were at Cranwell. In store at Cranwell until February 1919, and finally deleted in September.
SS Zero SSZ 23 (US Navy)	27 Dec 1917 - 9 Mar 1918	SSZ 23 was delivered to Cranwell and inflated there on 27 December 1917. Ordered by the US Government, she was the property of the US Navy and was used to train US Navy cadets, starting on 2 January 1918. The cadets flew with RNAS instructors and engineers. However, she did not stay at Cranwell for long, for on 9 March, 1918, she departed for Howden where she was used for routine war patrols using the recently trained US Navy pilots. Most operations were conducted from a mooring out site at Lowthorpe. On 13 August 1918, SSZ 23 returned to Howden where she was deflated and prepared for shipment to the United States. She was shipped to Naval Air Station Hampton Roads, Virginia, and was issued with the US Navy serial A5563. She is believed to have been flown in America but her subsequent history is obscure. Total flight time in the UK was 418 hours.
SS Zero SSZ 61	4 May - 16 Nov 1918	SSZ 61 was first flown at Kingsnorth on 2 May 1918, and left for delivery to Cranwell via Pulham the same day. She arrived at Cranwell on 4 May. On 6 May she made a rare visit to Cardington, probably the first visit of a Zero to this station. She spent her entire career at Cranwell, making a last flight on 16 November 1918. Total flight time was 324 hours.

Type	Dates at Cranwell	Remarks
Vickers-Parseval HMA No 6	6 Aug 1917 - 17 Feb 1918	First flew at Barrow on 17 December 1915, and made a few fights there during January and February 1916, before being deflated, along with the other non-rigids at Barrow, to make room in the shed for HMA Nos 9 and 23. Required at Howden for crew training, she could not be moved there until January 1917, owing to a lack of shed space. She finally flew there on 11 May 1917, making a small number of patrols and instructional flights until 6 August 1917, when she was flown to Cranwell. Used for cross-country instructional flights and a few patrols, she was eventually transferred to Pulham on 17 February 1918, where the car was extensively modified. The two Maybach engines and swivelling propellers were removed and replaced by two direct-drive Renault engines which gave the ship a new lease of life. The swivelling propeller gear had been a constant source of trouble. Used mainly for war patrols and a few experimental flights, the modified HMA No 6 remained in service at Pulham until the end of the war. Her last flight was on 6 November 1918, when she was deflated for an envelope inspection. If the war had not ended she would have been put back into service. Total fight time was 488 hours.
North Sea NS 11	31 Mar - Jun 1919	First flown at Kingsnorth on 22 August 1918, she was delivered to Longside, via Howden, on 6 September. She was used there on long war patrols until the end of the war and continued in service into 1919. Between 16 - 18 March 1919 she attempted to fly right round the North Sea from East Fortune but an engine problem resulted in a premature landing at Eastchurch airfield after a flight of 40 hours 30 minutes. Transferred to nearby Kingsnorth, she then flew to Cranwell on 31 March and remained there making a number of flights before moving on to Pulham on an unknown date in June. It was on a flight from there on 15 July 1919, that she was lost off the north Norfolk coast, having caught fire in the air as a result, it is believed, of being struck by lightning. There were no survivors amongst the nine crew members.

Type	Dates at Cranwell	Remarks
Rigid Airships HMA No 9R	Oct 1917	First flown at Barrow on 27 November 1916, she was delivered to Howden on 4 April 1917, and was used as a training ship with a few war patrols until transferred to Pulham to be used for mooring experiments. On 15 October 1917, No 9 was flown to Cranwell to make room in the Howden shed for HMA No 23 and No 25. On 29 October, she set off for patrol but was recalled to Cranwell on account of impending bad weather. However, the weather closed Cranwell before she could get there and she diverted to Howden. She was damaged by strong cross-winds while being taken into the shed and was laid up for the next three months. She flew again at Howden on 14 February, 1918, by which time the decision had been taken to transfer the ship to Pulham.
Rigid Airships HMA No 25R	5 Apr 1918 - Sep 1919	First flown at Barlow on 14 October 1917, she was flown directly to Howden that day, although the ship was not completely finished. Armstrong Whitworth engineers finished the work at Howden. She resumed flying on 23 December, made no flights in January 1918, and very few in February or March. She was transferred to Cranwell on 5 April 1918, and made a flight from there on 22 April, and again on 23rd when she flew to Pulham and back. She was then laid up for the fitting of a new after engine car, resuming flying on 25 June. She then made infrequent training flights, the last being on 20 November 1918. She was then laid up indefinitely and in the event did not fly again. She was used for non-flying experiments until May, and was finally scrapped in September 1919. Total flight time was 207 hours 25 minutes, which included 9 war patrols in 1918, totalling 64 hours.

Airships that transited Cranwell

Most of these ships were staging through Cranwell on delivery lights to their permanent stations. Although they had the range to make long cross-county flights, airships were slow and uncomfortable when flying over land, due to turbulence and thermals. Consequently, crews liked to stage through other stations on route, particularly if they stayed overnight and had a good hot meal. They were also able to catch up with old friends they had not seen from their days of training or posting to different stations. 1918 was particularly busy, with new Zeros, Coastal Stars and SS Twins being delivered in increasing numbers.

Type	Dates at Cranwell	Remarks
SS Zero SSZ 3	10 - 13 Jul 1918	10 July 1918, from Pulham en route to East Fortune. Departed on the 13th to East Fortune via Howden.
SS Zero SSZ 31	12 - 14 Mar 1918	12 March 1918, from Pulham en route to Howden. Departed on the 14th for Howden.
SS Zero SSZ 33	21 Mar 1918	21 March 1918, from Pulham en route to Howden. Departed same day.
SS Zero SSZ 34	21 - 23 Mar 1918	21 March 1918, from Wormwood Scrubs en route to Anglesey. Departed on the 23rd for Howden.
SS Zero SSZ 38	8 - 9 April 1918	8 April 1918, from Wormwood Scrubs en route to Howden. Departed on the 9th for Howden.
SS Zero SSZ 50	9 - 12 Mar 1918	9 March 1918, from Pulham en route to Anglesey. Departed on the 12th for Howden. Delayed by bad weather.
SS Zero SSZ 51	9 - 12 Mar 1918	9 March 1918, from Pulham en route to Anglesey. Departed on the 12th for Howden. Delayed by bad weather.
SS Zero SSZ 59	25 Apr 1918	25 April 1918, from Kingsnorth en route to East Fortune. Departed the same day for Howden.
SS Zero SSZ 60	26 Apr - 8 May 1918	26 April 1918, from Kingsnorth en route to East Fortune. Departed on 8 May for Howden. Reason for delay not given in Daily Report.
SS Zero SSZ 62	8 - 9 May 1918	8 May 1918, from Pulham en route to Howden. Departed on the 9th for Howden.
SS Zero SSZ 63	9 - 10 May 1918	9 May 1918, from Pulham en route to Howden. Departed on the 10th for Howden.
SS Zero SSZ 65	May 1918	18 May 1918, from Pulham en route to East Fortune. Departed on the 19th for Howden.

Type	Dates at Cranwell	Remarks
SS Zero SSZ 66	19 May 1918	19 May 1918, from Pulham en route to East Fortune. Departed same day for Howden.
Vickers-Parseval HMA No 5	11 - 18 Dec 1917	11 December 1917, from Howden to make room in shed for NS 5 on her way from Kingsnorth to East Fortune. Made a No 18 Patrol from Howden before landing at Cranwell. Departed on the 18th for Howden.
Coastal C 4	11 - 15 Oct 1917	11 October 1917, from Howden to make room in shed for NS 4. Departed on the 15th for patrol and return to Howden.
Coastal C 19	Various Dates	24 September, 1917, from Howden to refuel. Departed same day for patrol and return to Howden. 11 October 1917, from Howden to make room in shed for NS 4. Departed on the 15th for patrol and return to Howden. Arrived with C 4. 14 March 1918, from Howden en route to Kingsnorth. Rudder had come adrift with three out of four hinges breaking. Extract from ADM 273: Account forwarded by Wing Cdr J N Fletcher C/O Cranwell: "Flt Cdr F Cleary (captain of C 19) handled his ship in a very skilful manner, with a wind of 20 mph and bumpy weather. He brought her accurately to the landing block, although there was a landing party read to follow him. He deserves great credit for such a fine performance." After repairs, departed for Kingsnorth the same day.
Coastal C 21	8 - 9 April 1918	12 February 1918, from Howden en route for Folkestone. Landed at Cranwell owing to weather conditions. Departed on the 15th for Folkestone.
Coastal Star C* 7	16 - 17 Jun 1918	16 June 1918, Pulham to Howden but diverted to Cranwell owing to bad weather. On delivery from Kingsnorth, via Pulham, to East Fortune. Departed on the 17th direct to East Fortune.

Type	Dates at Cranwell	Remarks
Coastal Star C* 8	6 Jul - 10 Aug 1918	6 July 1918, from Pulham en route to East Fortune. Departed on 10 August 1918, direct to East Fortune. Reason for delay not reported.
North Sea NS 4	17 - 18 Oct 1918	17 October 1918, from Kingsnorth en route to East Fortune. Departed on the 18th to Howden.
SS Twin SST 3	28 - 29 Jul 1918	28 July 1918, from Wormwood Scrubs, en route to Howden. Departed on the 29th to Howden.
SS Twin SST 5	11 - 16 Aug 1918	11 August 1918, from Wormwood Scrubs, en route to Howden. Departed on the 16th to Howden.
SS Twin SST 9	15 - 17 Oct 1918	15 October 1918, from Wormwood Scrubs, en route to Howden. Departed on the 17th to Howden.
SS Twin SST 10	Various Dates	17 October, 1918, from Wormwood Scrubs, en route to Howden. Departed on the 18th to Howden. 24 February 1919, from Howden. Departed on the 25th for Howden.
SS Twin SST 12	25 - 26 Oct 1918	25 October 1918, from Wormwood Scrubs, en route to Howden. Departed on the 26th to Howden.

AIRSHIP PIONEER

CLIVE MAITLAND WATERLOW
Lieutenant Colonel - Royal Engineers and Wing Commander - Royal Naval Air Service

Clive Maitland Waterlow was born on 9 September 1885 and was the eldest son of David Sydney Waterlow JP MP and his wife Edith of Cromwell Gardens, London.

Waterlow was educated at Rugby School and in 1902 he entered the Royal Military Academy Woolwich. In March 1905, Waterlow was commissioned in to the Royal Engineers (RE). In 1906, he joined the Balloon School at Farnborough. On 14 February 1911, Waterlow was awarded the third airship pilot's certificate issued by the Royal Aero Club and went on to become an airship pioneer. With regards to airships, he is quoted as having said:

> *"I believe in the future of the airship, as I have always done, and in token of my belief I intend to devote my life to its development, if I am allowed."*

> *"A few years hence a ship the size of the 'Beta' will be the aerial yacht of many men who now keep a motor-car; that hydrogen will be as cheap as coal gas, and that one 'fill' will last a year."*

In 1914, command of the Army's airships was transferred to the Admiralty and Waterlow duly joined the Royal Naval Air Service (RNAS). He twice took Balloon Companies to the Front, in October and November 1914. Thereafter he served at Kingsnorth, Wormwood Scrubs and Cranwell Air Stations.

CM Waterlow (second from left) 1913
Image – Courtesy of the Pennoyer Centre, Norfolk

In June 1916, he became a Wing Commander (RNAS) and two months later was made a temporary Lieutenant Colonel (RE). His appointment at Cranwell was Officer Commanding Lighter-than-Air Craft.

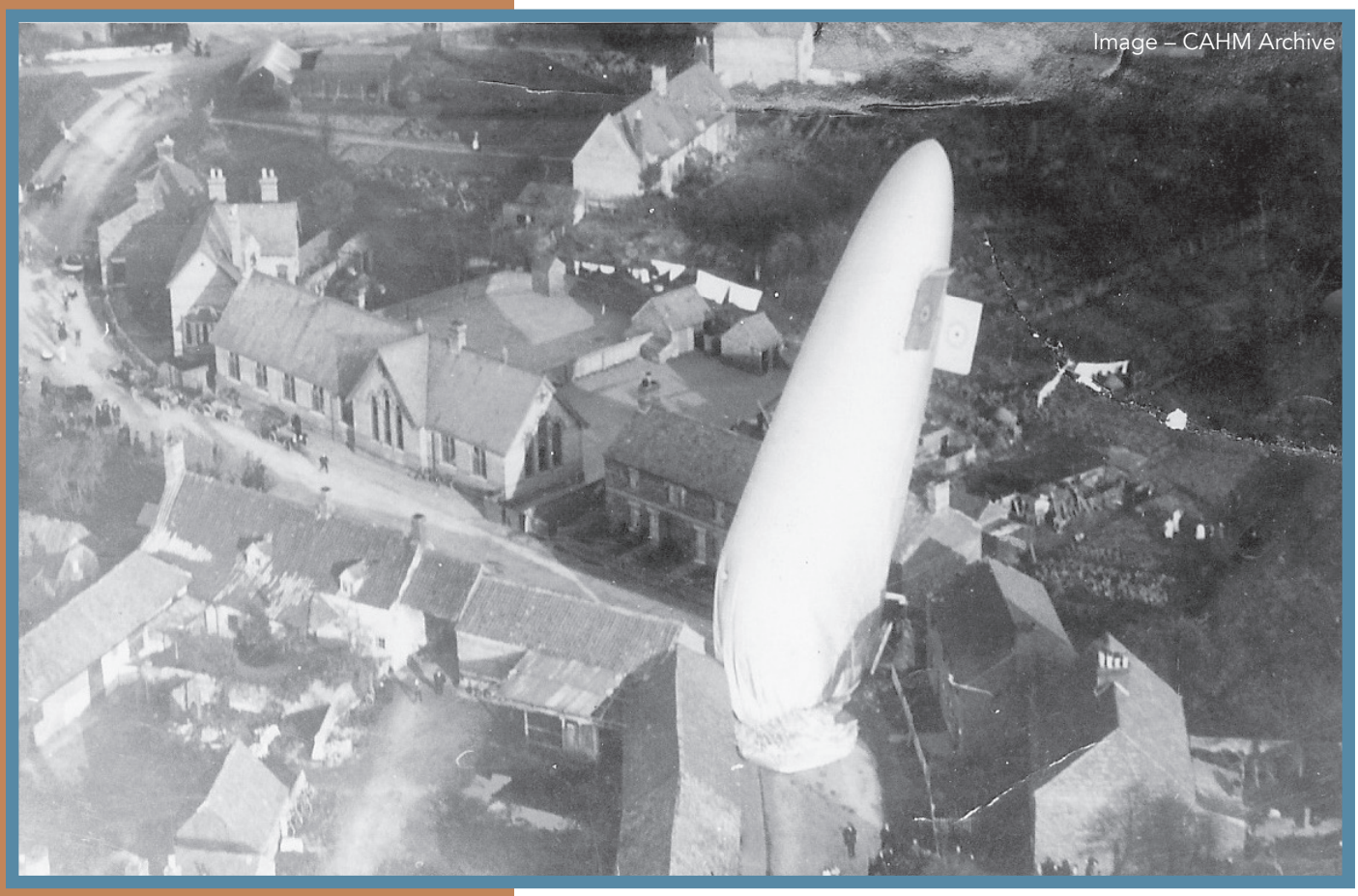


Image – CAHM Archive

"Ironically, the accident was one that had always been a cause of concern as far as Waterlow was concerned…. Having observed members of landing parties allowing themselves to be lifted off their feet when handling airships on the ground, he issued specific orders to all crews that this was forbidden and to be avoided at all cost."

Extract from Captain W J Pullen's account of the incident

On 20 July 1917, Lt Col Waterlow died in a tragic incident whilst assisting in the landing and mooring of an airship at Cranwell. He was 31 years of age.

Whilst Submarine Scout 39 was being walked by a landing party back to its shed at Cranwell, a sudden upcurrent caught the airship and dragged it upwards. Most of the landing party let go of the ropes holding the airship. Three held on and were carried upwards to a great altitude. Ironically, one of them was Lt Col Waterlow. The men were unable to get their legs around the ropes, to ease the strain on their arms and eventually all fell to their deaths.

This was not the first accident that Submarine Scout 39 was involved in. On 15 November 1916, whilst en route to Cranwell from Wormwood Scrubs, on its delivery flight, the airship crashed, due to a valve failure, in Thurlby village.

Image – Jon Riley

Clive Maitland Waterlow married Joan Clare of Farnham on 9 June 1917, just six weeks before his death. He is buried, just a few miles from this Museum, in the churchyard at Leasingham.

The 26 July 1917 issue of the publication 'Flight' included the following obituary:

> *"Lieut.-Col. CLIVE MAITLAND WATERLOW, R.E., a Wing Commander of the R.N.A.S., who has been killed in an accident in the Eastern Counties while assisting to moor a naval airship, was one of the most enthusiastic and active airship pioneers in Great Britain. Born in 1886, he was the only son of Mr. David Sydney Waterlow, formerly M.P. for Islington, and grandson of the late Sir Sydney Waterlow. He entered at Woolwich and passed into the Royal Engineers at Chatham from which he went on to the balloon factory at Farnborough under Col. -now General - C. B. Capper. Col. Waterlow held the third airship pilot's certificate issued by the Royal Aero Club, which he obtained on Feb. 14th, 1911. He had made a long study of the airship and its possibilities as a military weapon, and on the airship squadron of the Military Wing of the Royal Flying Corps being transferred to the Naval Wing in January, 1914. He went with it, and it is an open secret that he has rendered brilliant service in that connection since the outbreak of war. Col. Waterlow was only married as recently as June 9th last, his bride being Miss Joan Clare, youngest daughter of Mr. and Mrs. Clare, Farlands Croft, Farnham."*

Reproduced by kind permission of Flightglobal

The other two men that were killed in the accident were: Petty Officer Air Mechanic Maurice George Collins and Air Mechanic Second Class Simon Lightstone.

F 4670 Petty Officer Collins was born on 10 May 1895 in London and by trade was a fitter and turner. He enlisted into the RNAS on 11 May 1915 for the duration of hostilities. Petty Officer Collins is buried at Wandsworth Cemetery.

F 15791 Air Mechanic II Simon Lightstone was born on 27 November 1897 in London. By trade he was a warehouseman. Air Mechanic Lightstone joined the RNAS on 6 June 1916 for the duration of hostilities. He is interred at Plashets Jewish Cemetery.

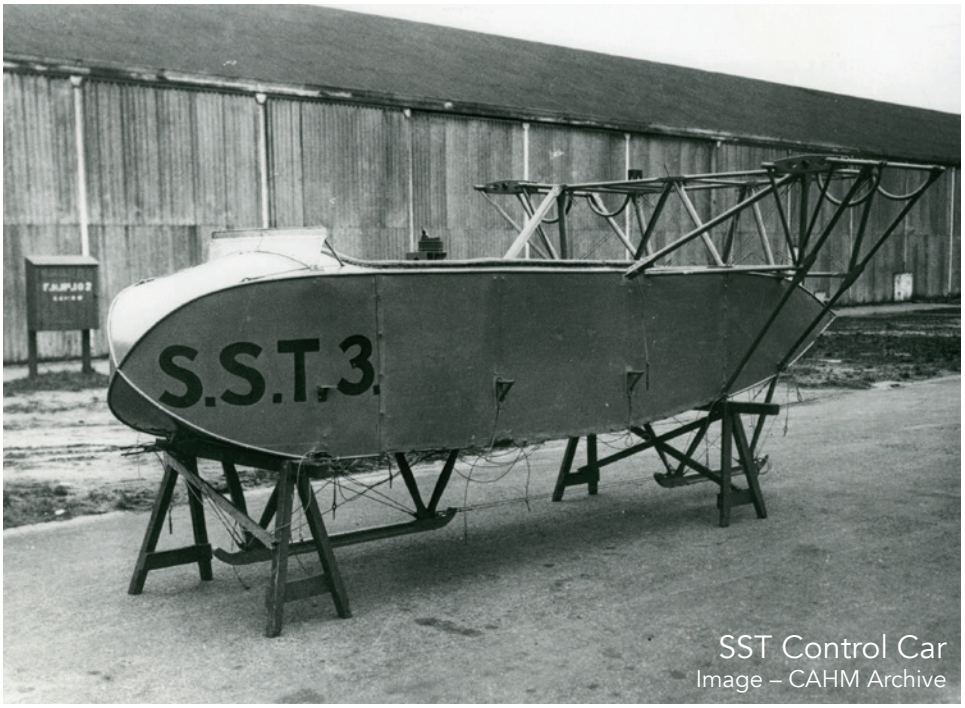
AIRSHIP CREWS

"You young gents are going to fly. You'll probably all be killed or win VC's within a year."
Sir Thomas Elmhirst – Extract from 'Coastal Patrol' - Copyright Brian J Turpin 2016

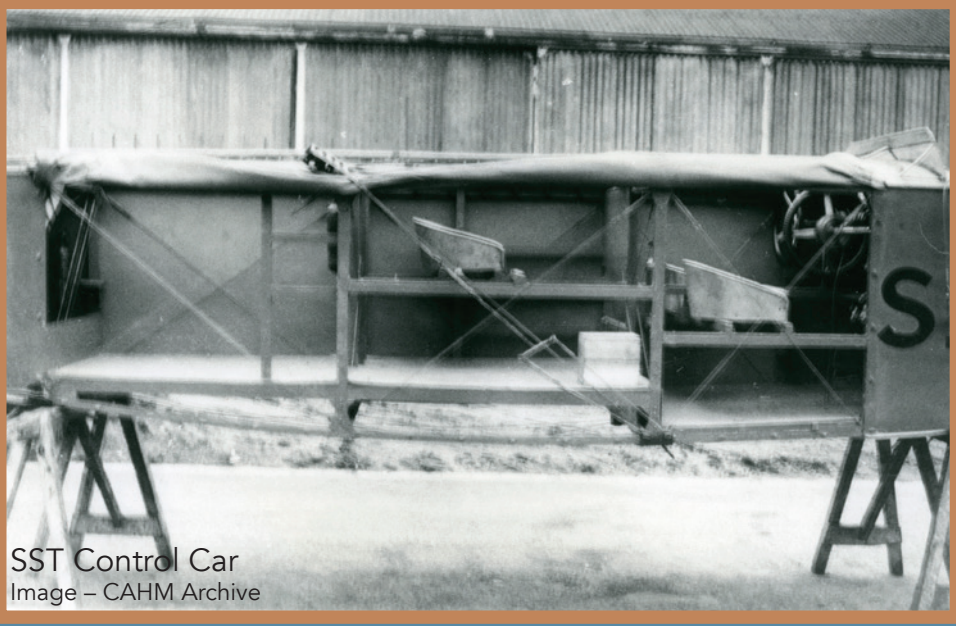
In 1914, command of all military airships became the responsibility of the Admiralty and on 1 July of that year, the Royal Naval Air Service (RNAS) was formed.

In 1915, it was decided to establish a force of small airships that could counter the threat posed by German submarines. To crew them, volunteers were initially sought from the Royal Navy's junior officers.

At first, the crews were trained to fly in balloons. This consisted of five training flights followed by a flight acting as pilot accompanied by an instructor, a night training flight and finally a solo flight.



SST Control Car
Image – CAHM Archive



SST Control Car
Image – CAHM Archive

Next came airship training. One of the early RNAS pilots described his training as five circuits of an airfield watching over the shoulder of the pilot, to see how an airship was operated. This was followed by a solo flight and being awarded with an Airship Pilot's Certificate.

Training did become more structured in 1917 when Cranwell became the RNAS' main training site.

Submarine Scout airships were operated from a control car, which was typically adapted from an aeroplane fuselage. The control car of a Submarine Scout Twin class airship was less than 20 feet in length and carried a crew of five men.

Operating at altitude on a patrol lasting for several hours could not have been a comfortable experience in these conditions.

Cold and draught was a significant factor, hence the sturdy outer clothing the airship crews wore.

Image – CAHM Archive

The later and larger Coastal Star class airships retained an open cockpit. They too carried a crew of five men.

At the front cockpit was a Coxswain who steered the ship under orders from the Captain, a Second Officer who assisted with navigation, the Captain, a wireless telegraph operator/gun layer, and at the rear an engineer.

Crew of a Coastal Star Coxswain presumed to be the photographer

Image – Courtesy of Brian J. Turpin

ATTACK FROM THE AIR

Air Raid – "An attack by military aircraft in which bombs are dropped."
Collins English Dictionary

In today's conflicts, attacks from the air are typically carried out by manned and remotely piloted aircraft, commonly referred to as 'drones'.

The missiles and bombs they use in attacks on ground targets are, in the main, precision guided weapons.

Typhoons and remotely piloted aircraft are operated by the RAF in Lincolnshire.

Attacks can also be conducted against ground targets using cruise missiles such as the Tomahawk. The UK's Tomahawk missiles are launched from submarines. Cruise missiles weigh over 2800 pounds and have a range of more than 1000 miles.

During World War 2, the RAF and other allied forces launched so many raids on Germany from bases in Lincolnshire that it became known as 'Bomber County'. Lincolnshire was selected as the site for so many bomber bases due to the flatness of its terrain and its proximity to Germany.

Lincolnshire based Lancaster bombers of 617 Squadron carried out the 'Dam Busters' raid in May 1943. Using bouncing bombs, designed by Barnes Wallis, two dams in Germany's Ruhr valley were destroyed in the raid. The destruction of the dams resulted in devastating flooding.

In World War 1, the first attempts by Germany to bomb Britain were carried out by seaplanes dropping bombs over Dover in December 1914. Raids such as this were usually conducted during daylight by one or two aircraft. They continued throughout the war but had little effect.

Germany's strategic bombing campaign against Britain started in earnest on 19 January 1915 with German airships, known as Zeppelins, dropping bombs on Great Yarmouth and Kings Lynn. The Zeppelins were huge in size (518 feet long and with a diameter of 49 feet). Dependent on their type, Zeppelins had a crew of 16 to 22 men.

The threat posed by German airships had been considered long before World War 1. In 1907, HG Wells published a science fiction novel called The War in the Air. This work detailed Germany carrying out a bombing raid against the USA using 'a huge herd of airships'.

A year before World War 1 broke out the publication 'Flight' was describing a 'struggle for control in the air' drawing attention to the small number of airships Britain had in comparison to the other major powers.

By February 1916, the threat of aerial attack was being highlighted to the British public and posters to help identify enemy aircraft were being published. The final Zeppelin raid on Britain was carried out on 5 August 1918 over the Norfolk coast.

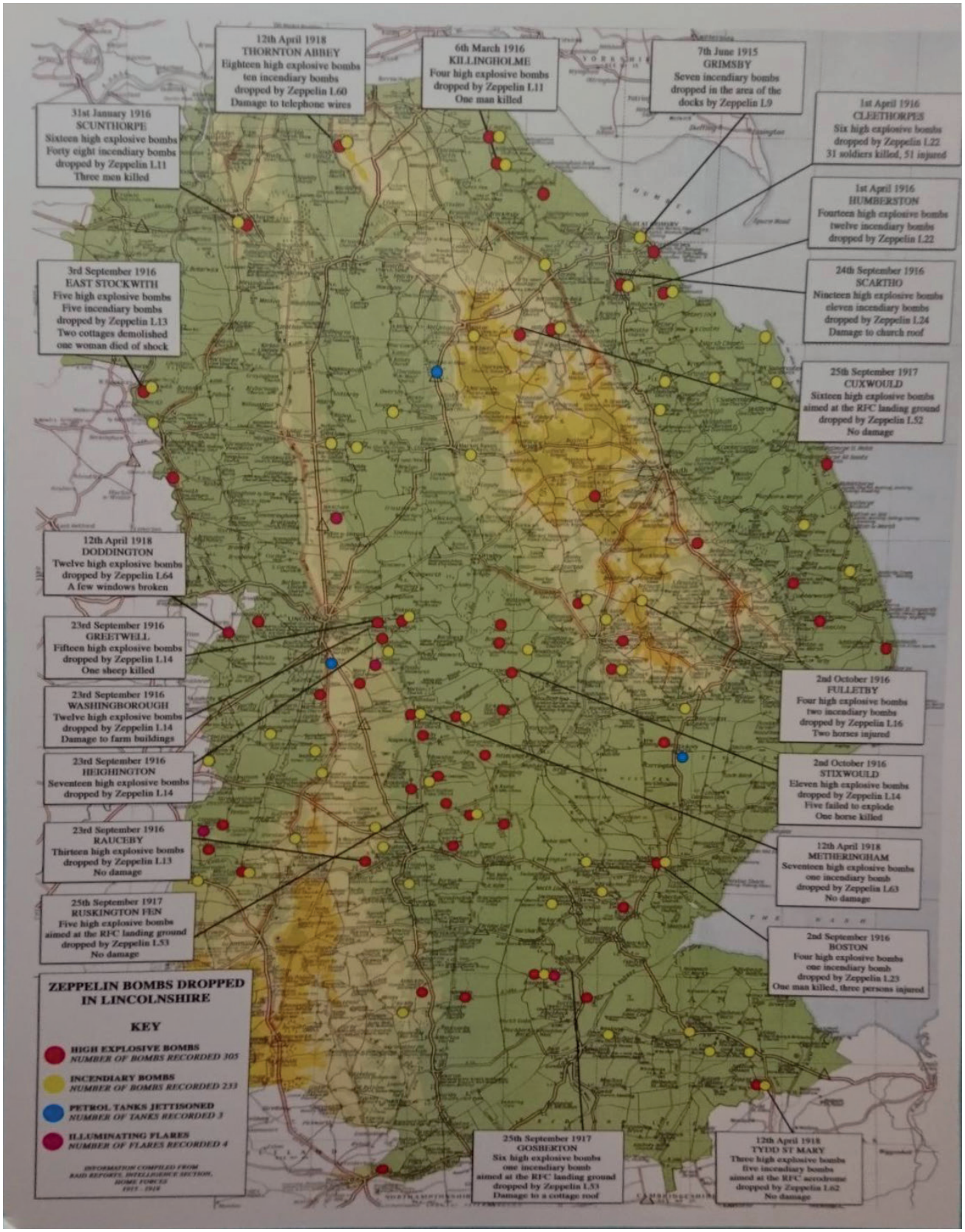
From a strategic viewpoint it can be argued that the Zeppelin raids had little effect militarily. They did lead to resources being diverted from the Western Front and did cause some disruption to industrial output.

From a human perspective however, 557 people had been killed across the country and 1358 people injured. That aside, the Zeppelins also caused widespread fear and panic amongst the public.

It is quite understandable as to why the Zeppelins were dubbed 'baby-killers'.

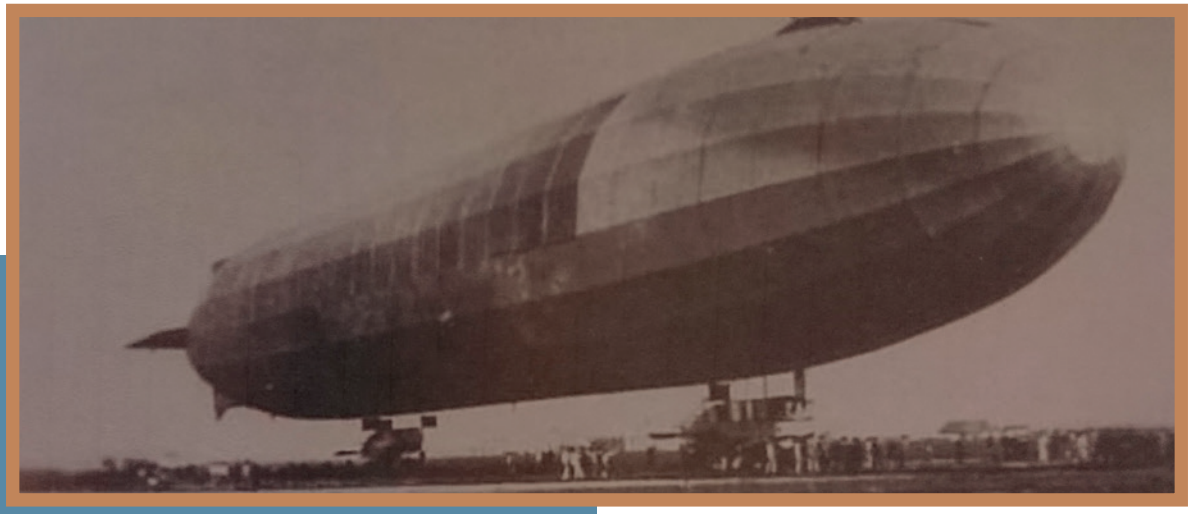
Image – Reproduced by kind permission of Aviation Heritage Lincolnshire

ZEPPELIN RAIDS ON LINCOLNSHIRE



THE ZEPPELIN RAID ON CLEETHORPES

"The highest death toll for a single enemy bomb in Britain during the Great War."
Extract from 'Flames in the Night' by Mr MJ Hodgson



Zeppelin L22
Image – Courtesy of Thorpe Camp Visitor Centre

During the night of 31 March 1916, the air raid warning sounded and by 1.30am on 1 April the sound of an approaching German airship, the L22, could be heard over Cleethorpes. The Zeppelin approached from the south east, after aborting her intended target, London because of engine problems. The commander of the Zeppelin, Kapitänleutnant Martin Dietrich instead turned north to attack Grimsby docks.

At 1.48am the Zeppelin released six high explosive bombs over Cleethorpes, the first of which hit the Alexandra Road, Baptist Chapel, unfortunately this was the billet of men from 'E' Company of the 3rd Battalion the Manchester Regiment who had arrived in Cleethorpes the day before to begin Coastal Defence duties.

Zeppelin over Norfolk
Image – Courtesy of True's Yard Fisherfolk Museum

The devastation was horrific, killing 31 of them. Most of the remaining men from 'E' Company were wounded. Four men escaped uninjured as they had been playing cards in a cellar under the Chapel at the time.

This was the greatest number of fatalities caused by single bomb dropped on Britain during World War One.

The damage caused to the Baptist Chapel
Image – Courtesy of the Lincolnshire Archives

The Home Forces communiqué: 7.40pm Sunday April 2nd 1916 reported:

"The total casualties reported as a result of the Zeppelin raid on the night of March 31st-1st April now amount to: killed 43, injured 66. Nearly 200 explosive and incendiary bombs were dropped. A Baptist chapel, three dwelling houses and two cottages were demolished, and a town hall, four dwelling houses, 35 cottages and a tramway car shed partially wrecked, but no military damage was caused."

However the German communiqué, Berlin - Sunday April 2nd 1916 stated:

"During the night of March 31st-April 1st one of our airship squadrons attacked London and the south coast of England. …and bombs were finally dropped on the fortification works and harbours on the Humber, whereby three batteries were reduced to silence. All the attacks were successful, and reliable observations from the airships discerned the presence of numerous fires and the collapse of buildings."

Extracts courtesy of Mr MJ Hodgson - 'Flames in the Night'.

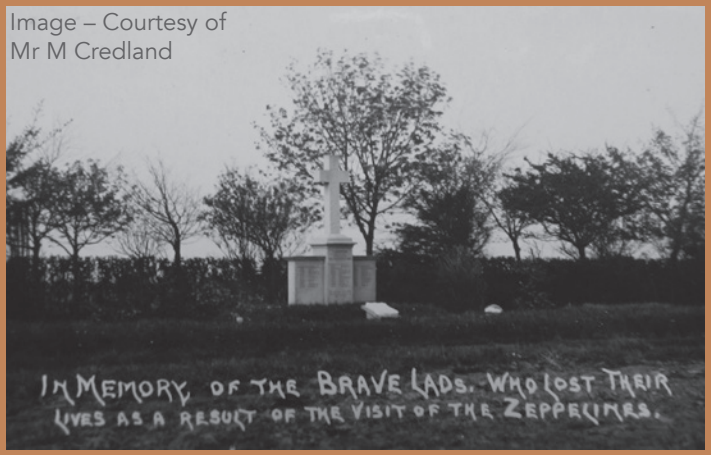


Image – Courtesy of Mr M Credland

On 29 March 1918, a white stone cross memorial, paid for by the people of Cleethorpes, was erected on the grave site, and dedicated to the men buried there. The inscription reads:

"In Memoriam
NCO's and men of the 3rd Battalion the Manchester Regiment who lost their lives whilst serving their country on 1st April 1916."

AIRSHIPS DURING THE INTER-WAR YEARS

"There above us, gliding into our vision, we saw an enormous silver-coloured Zeppelin. In open-mouthed astonishment we gazed at this magnificent spectacle, hypnotised into silence by the sheer size of it."
Extract from 'The One Day I'll Never Forget' by Luther Terry

In an age when our skies are filled with jets, helicopters, and even the odd drone or two, it is difficult to believe that airships were once considered the future. The first modern airship, the Zeppelin LZ1, took flight in 1900, three years before the Wright Brothers made their famous flight.

Due to their relative cost-effectiveness and range, airships were seen as the more attractive form of air travel in the early 20th Century. By the 1930s luxury airships were whisking wealthy passengers across the Atlantic. But political interventions and tragedies conspired to burst the bubble of global airship travel, most notably with the infamous Hindenburg disaster.

German Airship Developments

On 6 May 1937, during a landing in Lakehurst, New Jersey, the hydrogen filled Hindenburg exploded in a huge fireball. It wasn't the deadliest airship disaster, but it was dramatic, and the most iconic. 36 passengers and crew died. There were however 62 survivors.

The Hindenburg crash could have caused political embarrassment for the Nazis as the Minister of Propaganda Joseph Goebbels had wanted the airship to be named after the Führer, Adolf Hitler.

The most successful German airship of the post-World War One period was the Graf Zeppelin. It flew for almost nine years from 1928 until its retirement on 18 June 1937. The main reason for its grounding was the decision by the United States to ban supplying Germany the helium it needed to lift its airships.

In March 1940, the Luftwaffe commander Hermann Göring ordered that all Zeppelins be scrapped as the metal was needed to build other aircraft. By the end of April, all the Zeppelins had been dismantled, and the hangars they had flown from at Frankfurt were demolished on 6 May 1940, three years to the day of the Hindenburg disaster.

Top - The Hindenburg's Lounge area
Bottom - Workman on the Hindenburg
Images – Courtesy of Mr C Clover

British Airship Developments

Various airships were planned in the UK, but after World War One the need for military airships diminished and most designs never made it off the drawing board.

One of the designs that did get completed and first flew in 1920, was the Vickers built R80. Originally planned for military use by the British Admiralty, it was completed for commercial passenger carrying purposes. However, R80 proved too small for this role, so she began a short career with the US Navy, before being scrapped in 1925.

There were also plans to sell R38 to the Americans, but it broke up over the Humber estuary on 23 August 1921, killing 44 of the 49 crew aboard. Its destruction was the first of the great airship disasters.

The Imperial Airship Scheme was initiated in the 1920s to develop a passenger and mail carrying service around the British Empire. Lord Thomson was appointed Secretary of State for Air, and began to drive the project forwards.

At the Airship Guarantee Company, Barnes Wallis and Nevil Shute worked on the R100.

In competition, the Royal Airship Works at Cardington in Bedfordshire developed the R101.

R100 was built with cost and potentially cheap mass production in mind, whilst also employing very accurate calculations to make the airship safe and stable in flight.

The Government backed R101 was beset by problems. Despite a lack of air testing, the Air Member for Supply and Research, Hugh Dowding (later the head of Fighter Command during the Battle of Britain) issued a certificate of airworthiness to R101 shortly before its ill-fated voyage to India. Dowding later lamented:

> *"I think I was wrong not to insist on much more extensive trials and tests."*

On 4 October 1930, R101 took off from Cardington bound for Karachi. On board was Lord Thomson. R101 had to lose ballast almost immediately after take-off due to being overloaded and struggled on the journey to stay in stable flight. The airship eventually lost height and came down near Beauvais, France, killing 48 of the 54 on board.

Amongst the dead were Lord Thomson, senior Government officials, and almost all the dirigible's designers from the Royal Airship Works, bringing an end to Britain's airship industry, for the time being. Barnes Wallis' successful R100 airship was a victim of the time. Support for the Imperial Airship Scheme ended and nobody in government wanted to be embarrassed by a private company achieving what they could not. R100 was duly scrapped in 1931.

By the end of World War Two, technology had progressed so much that airships as a commercial enterprise were effectively consigned to history for the next half century. But there was a time when they were considered the future, and for a brief romantic period between the wars carried passengers through the skies in luxury.

AIRSHIPS AND THE WILLIAM ALVEY OLD BOY

Images – Courtesy of Wiliam Alvey School

Charles William Penson was born on 12 January 1898 at Sleaford, Lincolnshire. He was the eldest of seven children whose father was James Ambrose Penson, a foundry worker.

On 15 June 1916 aged 18 Charles joined the Royal Navy as an Officers Steward 3rd Class, giving his trade as a tinsmith. Between 1916 and 28 August 1917, he was stationed at Royal Naval Air Service Training Establishment, Cranwell. Penson transferred to the newly formed RAF on 1 April 1918 as a Private 2nd Class (Batman) and on 2 April 1918, Charles re-mustered as Aircraftman 3rd Class (Rigger Airship).

In January 1919, Charles was promoted to Aircraftman 2nd Class (Rigger Airship) and posted in May to RAF Airship Station East Fortune, Lothian. Swiftly followed on 1 August 1919 by a promotion to Aircraftman 2nd Class (Rigger Airship, Group 2 Trade) and the award of a 1st Class Conduct Badge. Another promotion followed in November 1919 to Aircraftman 1st Class and Charles was posted to RAF Airship Base Leuchars, Fife on 1 April 1920. Finally followed by a posting to RAF Airship Base Howden, East Yorkshire in May 1920.

On 24 August 1921 the pride of the British Airship fleet, the R38 took off for a test flight in the early morning with the intended destination of RNAS Pulham in Norfolk. She was the biggest Airship in the world at the time and was 695 feet long with six 350HP engines giving her a speed of 60 knots. The fuel tanks held enough fuel to allow her to travel from Britain to Japan non- stop. The R38 was built at Cardington, Bedfordshire and had been sold to the USA for £500,000 to undertake a flight service from New York to San Francisco.

Three test flights had previously been undertaken with only minor issues found and corrected. In August 1921, the R38 took off from Howden, Yorkshire on her final test flight before the hand over to the Americans. On board was a crew of 49 who were mostly RAF personnel and 17 US Navy men and 4 civilian scientists. It was expected to be a trouble free flight and the US Navy were due to take over the Airship after the flight. One of the RAF contingent was Leading Air Craftsmen (AC1) CW Penson. The 23 year old Aircraftsman Penson was part of the Instructional Crew of England, who were a body of 25 experts who undertook Airship test flights.

Image – Courtesy of Wiliam Alvey School

Image – Courtesy of Wiliam Alvey School

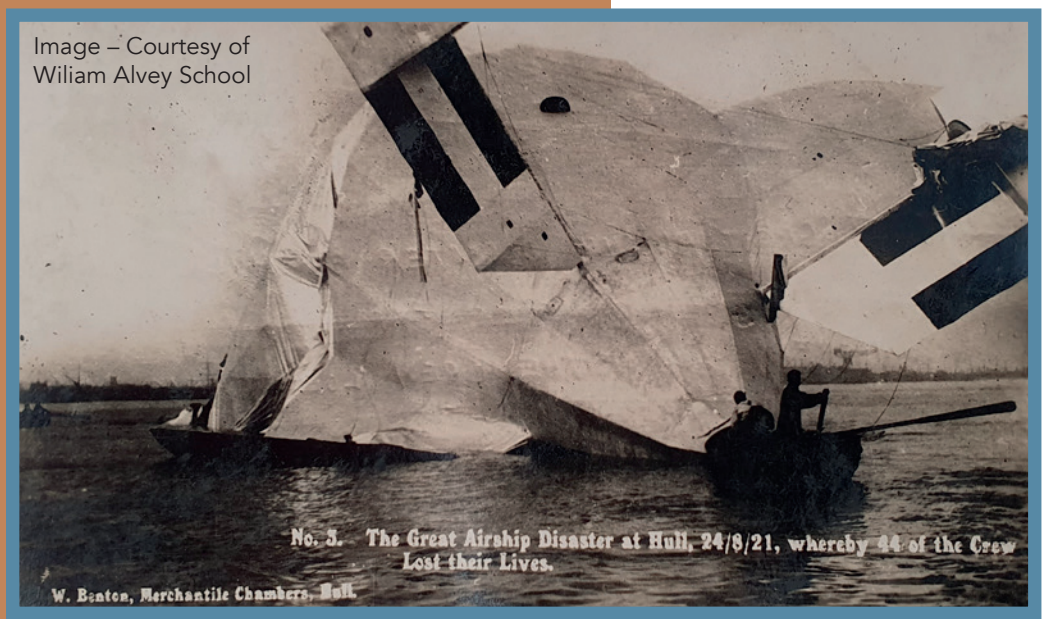


Image – Courtesy of Wiliam Alvey School

Less than 36 hours later at 17:37, while just offshore at Hull and watched by thousands of spectators, the Airship failed amidships. Eyewitnesses reported seeing creases down the body of the Airship before both ends drooped. This was followed by a fire in the front section and then by an explosion which broke windows over a large area. The front half of the Airship plunged into the Humber estuary in a blazing mass of Helium, petrol and fabric. Sixteen of the 17 Americans, and 28 of the 32 Britons, in the crew were killed, Of the 45 men in the front of the R38 only one survived – the R-38's British Commanding Officer Flight Lieutenant Archibald Herbert Wann who was in the control gondola. The tail piece miraculously floated down crashing into the waters of the Humber allowing 4 survivors to be rescued.

Image – Courtesy of Wiliam Alvey School

Unfortunately AC1 CW Penson was not among the survivors. He was brought home to Sleaford for his funeral service at St Deny's. All of the businesses of Sleaford closed for an hour during the service out of respect, and a large contingent of RAF personnel from RAF Cranwell attended the service. The RAF provided a large floral tribute and the Station also sent a Firing party and Bugle band to the service.

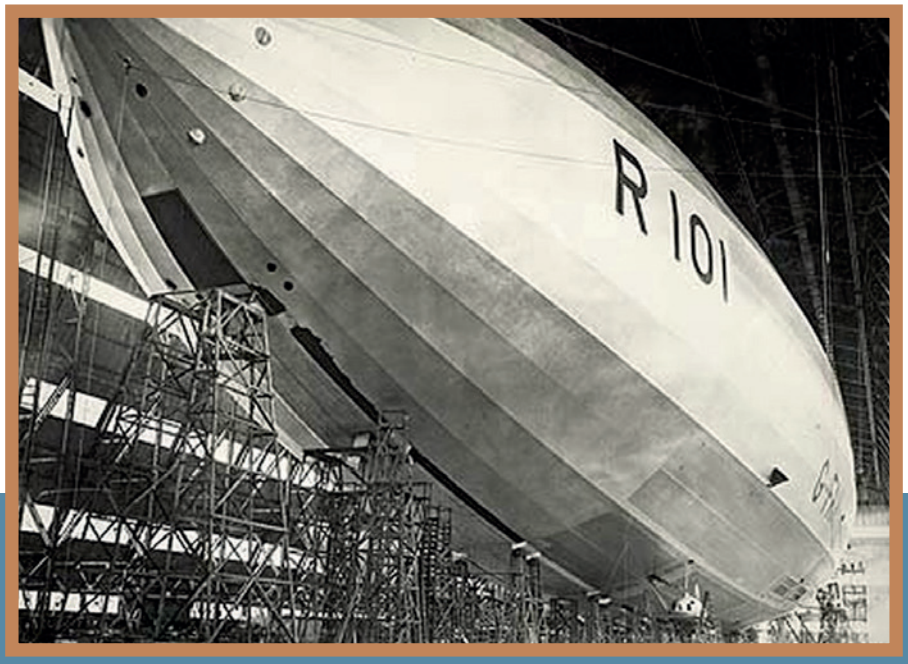
During the 1922 Empire Day celebrations in Sleaford a Roll of honour for 71 old boys who had died doing their duty was unveiled at the William Alvey School by Canon Langdon. He also mentioned a further addition to the memorial Charles Penson whom he said had done 'quite as much in defence of his country as those who laid down their lives on the battle-field.'

VITAL STATISTICS OF THE ICONIC COMMERCIAL AIRSHIPS

R-100
Image – Courtesy of CAHM Archive

R100

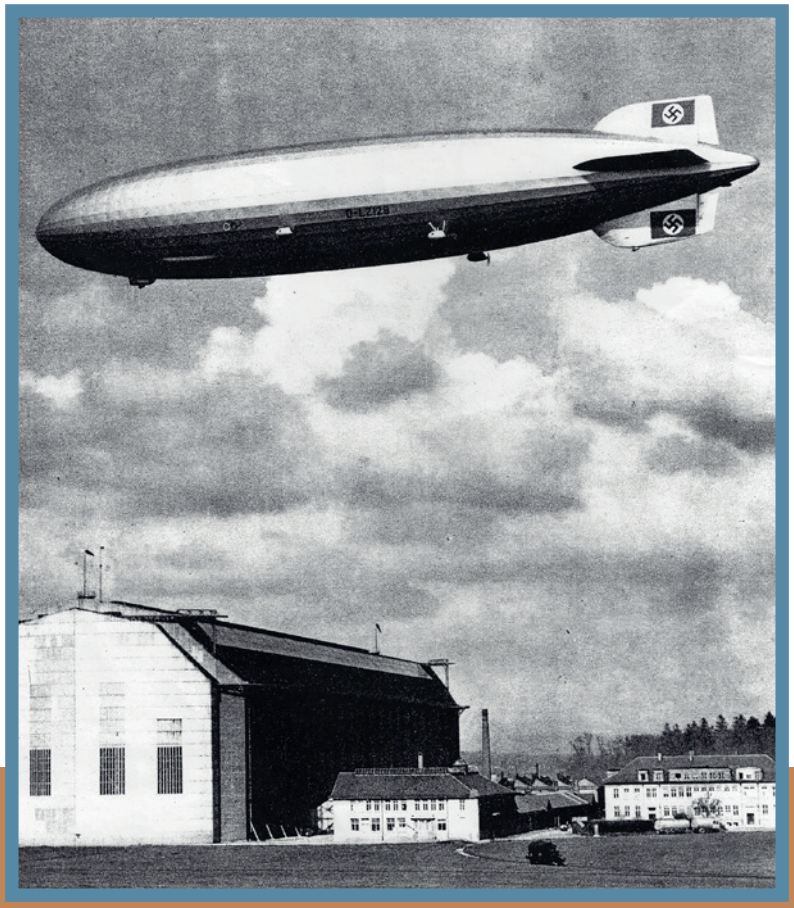
First flight:	16 December 1929
Flew from:	Cardington at 2.48am on 29 July 1930, arriving in Montreal, Canada, 5.37am on 1 August, 78 hours and 49 minutes later
Designed by:	Barnes Wallis and Nevil Shute Norway
Length:	709.5 feet (1929) reduced to 695 feet (1930)
Diameter:	133.5 feet
Range:	4095 miles
Top speed:	Cruising 64 MPH - Recorded Top Speed 81 MPH, limited to 70 MPH. Powered by 6 Rolls-Royce Condor engines (6 x 650 hp)
Capacity:	37 Crew, capacity for 100 passengers
Fate:	Scrapped after the R101 crash ended the Imperial Airship Scheme



R-101
Image – Courtesy of CAHM Archive

R101

First flight:	14 October 1929
Flew from:	Cardington, Bedford
Designed by:	V.C. Richmond (killed on its maiden voyage)
Length:	735 feet
Diameter:	131 ft 4 in (40 m)
Range:	4000 miles
Top speed:	61.5 MPH, powered by 5 Beardmore Tornado 8 cylinder inline diesel engines
Capacity:	42 crew, 12 passengers
Fate:	Crashed on maiden voyage to India, burning near Beauvais, France on 4 October 1930. 48 of the 54 on board died.



Hindenburg over Friedrichshafen
Image – Courtesy of Mr C Clover

LZ129 Hindenburg

First flight:	1936
Flew from:	Friedrichshafen Airport in nearby Löwenthal
Designed by:	Ludwig Dürr, under the direction of Dr Hugo Eckener, head of the Zeppelin Company.
Length:	803.8 feet
Diameter	41.2 m (135 ft 1 in)
Range:	3685 miles
Top speed:	Cruising speed: 76 MPH, Maximum speed: 84 MPH. Powered by 4 Daimler-Benz DB602 diesel engines
Capacity:	40 - 61 crew, 50 - 72 passengers
Fate:	Crashed and burned on landing at Lakehurst, New Jersey on 6 May 1937. 36 died, there were 62 survivors.

Graf Zeppelin over Cleethorpes, circa 1933
Image – Courtesy of Mr C Clover

Graf Zeppelin

First flight:	18 September 1928, under the command of Hugo Eckener
Flew from:	Friedrichshafen Airport in nearby Löwenthal
Designed by:	Ludwig Dürr
Length:	776 feet
Diameter:	41.2 m (135 ft 2 in)
Range:	6,200 miles
Top speed:	80 MPH (although it typically cruised at 72 MPH. Powered by 5 Maybach VL-2 12-cylinder engines.
Capacity:	40 crew, 20 passengers
Fate:	Retired 18 June 1937, scrapped March 1940 (completed 590 flights).

THE DAMBUSTER - BARNES WALLIS

Britain's greatest rigid airship designer

Sir Barnes Neville Wallis CBE, FRS, RDI, FRAeS was born on 26 September 1887 in Ripley, Derbyshire. At the age of two his family moved to London. Although he excelled at Maths, English and Science, by the end of his education in 1904 Barnes decided to 'get his hands dirty' by pursuing an apprenticeship in engineering.

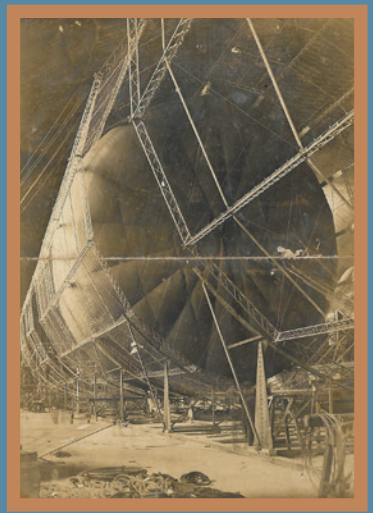
At 17, Barnes Wallis started an apprenticeship at Thames Engineering Works, before transferring to John Samuel White's on the Isle of Wight where he trained as a marine draughtsman and engineer. A promising start saw him promoted to the design office.

Barnes Wallis at his Drawing Board
Image – Courtesy of Thorpe Camp Visitor Centre

In 1912, he began a friendship with Hartley Blyth Pratt, who joined the firm from Vickers. With experience in fluid dynamics, and airship design becoming fashionable, Pratt was recalled to Vickers and asked Wallis to join him as his assistant. So began Wallis' long and distinguished career with the company.

R9

In 1913, Wallis and Pratt began their design for a rigid airship. By early 1914, work started, but progress was slowed by the outbreak of war. Materials were needed for the war effort, and the Admiralty cancelled the order for the airship.



R9 under construction
Image – Courtesy of Mr MJ Hodgson

R9 in flight
Image – CAHM Archive

"Churchill stopped the building of the R.9 at the beginning of the war because everybody thought the war would be over in three or four months. Pratt and I rushed off and enlisted in the Artists' Rifles."

Churchill was replaced as First Lord of the Admiralty by Arthur Balfour in 1915, and work resumed once Pratt and Wallis were recalled from the Army. It took a further year to get airborne though, as the Easter Rising in Ireland slowed the delivery of flax required to make nets for the gas bags.

R80

Work followed at Vickers facilities in Barrow in Furness on further airship designs, including, the R80, but labour shortages, shortage of steel, and the end of World War One meant the future of military airships was reviewed.

R100

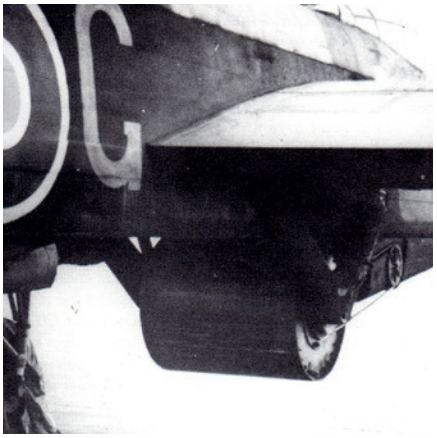
Barnes Wallis began using new design techniques to create an airship that would even surpass the mighty German Zeppelin. Construction of the R100 began in 1927 using as few different parts as possible, with as few machines, to minimise costs.

In competition with the Air Ministry who were developing the rival R101, Wallis' machine was successfully trialled, and took off from Cardington in the early hours of 29 July 1930 bound for Canada. It made the 3,364 mile journey in 78 hours and 49 minutes, and whilst moored for 12 days in Montreal more than 100,000 people came to see the ship each day.

Wallis' R100 represented the best that airship technology in Britain had to offer at the time.

Subsequent Work

Wallis' later work is now the stuff of legend, thanks in no small part to the exploits of Lincolnshire's very own Dambusters, 617 Squadron. His Upkeep, Tallboy and Grand Slam bombs did much to damage the Nazi war effort in World War Two.



Bouncing Bomb
Image – Courtesy of Thorpe Camp Visitor Centre

Wallis' subsequent work on Supersonic and Hypersonic aircraft design, radio telescopes and submarines has proven Barnes Wallis as one of this country's greatest engineering minds.

After the war, he led aeronautical research and development at Vickers and the British Aircraft Corporation until 1971. Wallis became a fellow of the Royal Society in 1954 and was knighted in 1968. He died on 20 October 1979 and is buried in St. Lawrence Churchyard, Effingham in Surrey.

LIGHTER THAN AIR ACTIVITIES TODAY

"I believe in the future of the airship, as I have always done."
Lt Col CM Waterlow 1885 – 1917

Interest in developing airships declined in Europe and the USA in both the commercial and military sectors during the early part of the 20th Century. For the UK, commercial interest ended when R101 crashed in 1930. American and German interest in airships disappeared with the 'Hindenburg disaster'. Today interest in 'lighter than air' craft seems to have been rekindled in both the USA and this country.

Developments in the USA

Recent media reports from the USA suggest their focus with regards to airships is mainly on military usage and intelligence gathering.

In 2015, the Los Angeles Times reported that the US Department of Defense has spent $2.7 billion developing a system of radar-equipped airships to provide early warning of attack from cruise missiles, drones or other low-flying weapons. The system known as JLENS is understood to have been under development since the late 1990s.

In April 2017, British media reported that the US National Security Agency had used an unmanned airship to intercept communications. The airship was reported in the article to be codenamed the 'Hover Hammer' and that it was able to operate, unmanned at altitudes of just under 20,000 feet for up to 48 hours at a time.

Airlander

In the UK, current interest in 'lighter than air' activities predominantly lies with 'Airlander 10', which is being developed, by a firm called Hybrid Air Vehicles, at Cardington, Bedfordshire. Airlander 10 is a hybrid airship which has auxiliary wing and tail surfaces.

Airlander 10 is non-rigid and its envelope is helium filled. It is powered by four 325 hp turbocharged diesel engines. Airlander 10 is designed to have a flight endurance of five days flying at altitudes of 20,000 feet carrying a payload of approximately 10 tons. At 302 feet in length, Airlander 10 is the largest aircraft flying today.

Hybrid Air Vehicle's intention is that Airlander will fill a wide range of roles in both the commercial and military domains.

Airlander 10 is currently in flight testing. Press releases state it completed its fourth flight on 13 June 2017, flying over Bedfordshire.

Cranwell Aviation Heritage Museum

North Kesteven DISTRICT COUNCIL

HEART OF LINCS

ACCREDITED MUSEUM

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